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# QUEENSLAND AGRICULTURAL JOURNAL.

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# QUEENSLAND AGRICULTURAL JOURNAL

VOL. II. JULY, 1914. PART 1.


# Agriculture.

## THE MOUNT LARCOM MINING HOMESTEAD AREA.

Reporting to the Under Secretary for Agriculture and Stock on his recent visit to the mining homestead area, Mount Larcom district, for the purpose of giving advice to settlers in regard to agricultural matters generally, Mr. G. B. Brooks, Instructor in Agriculture, says:—

"This portion of country lies to the south-west of the township, commencing at a point 3 miles distant and extending some 12 miles to the south.

"An outstanding feature in connection with this settlement is that it is undoubtedly the most thickly populated centre in Queensland, over 200 farmers being located on 80-acre blocks.

"*Physical Characteristics.*—The land in this locality is made up of gently undulating ridges, with the exception of the south-west corner, which is of a more hilly and broken nature. There is one disadvantage in connection with mining homestead areas, and that is the roads run in a straight line irrespective of the grade. The result is that in many places transport facilities are by no means of the best.

"*Soil.*—The formation is to a large extent of volcanic origin, mostly overlying limestone rock and covered with a more or less dense scrub. The soil is rich and friable, and generally of good depth.

"There are small areas of forest, timbered with box and gum, the soil being of a close textured grey clay nature. Samples of soil representing both scrub and forest were secured and handed over to the Agricultural Chemist for analysis.

"*Rainfall.*—Records covering a lengthy period were not procurable. The average annual rainfall is stated to be in the region of 43 in. Although this high average for the twelve months is of some importance, yet the average for the individual months would be far more so, for upon a well distributed rainfall depends the successful raising of many important crops.

"*Temperatures.*—In regard to the lines of development followed up, temperature is likely to prove an important factor. Many of the settlers are planting crops of a tropical habit, and others are about to make a move in the same direction.

"It will be found that fairly severe frost will be experienced in the low-lying portions, more especially when the scrub disappears, as it undoubtedly will in the near future. Some little care will, therefore, have to be exercised in regard to the keeping of such crops well above the frost line.

"*Lines of Development.*—This district being practically in its infancy, no definite system of cropping has yet been developed. The only marketable product so far produced, to any extent, is maize. To depend upon this crop alone entails a considerable amount of risk, as is seen during the present season, when in many instances the yield is reduced to less than half through lack of moisture.

"The raising of additional crops such as broom millet, onions, &c., was strongly advocated, with the result that several farmers have decided to plant experimental areas during the coming season.

"The growing of market garden crops was also discussed. Not only is the soil and climate favourable, but an outlet for the products would be found in Rockhampton and along the Central Railway Line; while a shipping port for the Southern markets is quite handy at Gladstone.

"During my visit tomatoes were to be found growing in wild luxuriance in the cleared areas, and, although tons were actually going to waste, apparently no effort is made to put them on the market.

"*Fruit Culture.*—Many of the settlers are putting down several acres in bananas, while smaller patches of pineapples are also being planted.

"*Sugar-growing.*—Experimental patches of cane are to be found all over the district; and, in the event of a mill being erected, a large number of farmers would undoubtedly engage in this industry.

"*Dairying.*—Although the climate and pasture is eminently suitable for dairying, still on a selection of 80 acres it will only be possible to maintain a small herd; and, to make this successful, it will be absolutely essential that only animals of a highly productive nature be kept.

"Pig-raising would be a necessary adjunct.

"*Water Supply.*—Unfortunately, very few of the settlers have a permanent supply of water. The cutting up of the land into 80-acre blocks has been the means of making the water problem a more difficult one than would have been the case had the areas been larger. Many of the selections are on broken limestone formation and without even a trace of any natural watercourse.

"In my report upon the adjoining German settlement area a suggestion was made that some assistance should be given in regard to the location of underground supplies in dry districts. This was given effect to, an automatic water-finder belonging to the Lands Department being secured on loan. This instrument formed part of my equipment during my visit to the mining homestead area.

"The weather was, unfortunately, showery during the first half of my tour in the district; therefore I did not consider it advisable to test for sites while these conditions obtained. The number selected during my stay was, therefore, not so numerous as would otherwise have been the case.

"It may be mentioned that several sites were pegged out during my previous visit by means of the divining rod. One was on the farm of Mr. W. J. Hamilton, who had recently put down two wells with negative results. He was pleased to inform me on my return that, in sinking where I had indicated, he had struck a flow at the shallow depth of 14 ft. On testing this site with the automatic finder, the result coincided exactly with that previously located. Another divined site was tested on the farm of Mr. J. N. McCulloch. In this case there was a difference of 1 yard between the finder and the rod.

"The relationship between the divining rod and the instrument is —according to the results so far obtained—remarkable. Out of some 14 tests made, the results were practically identical; and in most instances I could foretell how the instrument would act, and its peculiar behaviour according to the supposed underground stream, by previously prospecting with the 'rod.'

"The results obtained from sinking on the places indicated will be of extreme interest and importance, for, should supplies be obtained at a comparatively shallow depth, the benefits accruing to both settler and State would be inestimable.

"I would suggest that, as opportunity offers, data be collected as to the success or otherwise of obtaining water, depth of sinking, strata, &c. This information would be very valuable as a guide to future operations.

"The thanks of the Department are due to Mr. F. Finke, who spent some days in taking me over the south-west portion of the district, and also to Mr. T. D. Ferguson for information supplied."

## GOOD ROADS.

The road question is one of vital importance to farmers living at any distance from a railway station, and there are many splendid areas of arable land in all parts of the State which would become important centres of agricultural activities were it not for their inaccessibility owing to the want of roads of communication to a railway. Some ten years ago the Hon. A. J. Thynne, then Minister for Agriculture in this State, took up this question of road-making, and a series of articles on the subject, penned by him, appeared in the "Queensland Agricultural

Journal" (vols. XIV. and XV., 1904). A good article on road-making in farming districts was also published in vol. XXI., 1908.

It will be interesting to farmers in the districts alluded to by Mr. Thynne to note how the pioneers of the agricultural industry fared then, owing to the want of roads, ten years ago:—

"In the days when the Romans, under various emperors, extended their conquests to other lands, they invariably gave great attention to the construction of good military roads, especially in countries which they permanently occupied. There roads were so well constructed that they have lasted for over eighteen centuries, and are as good to-day as when the Roman generals, the soldiers, and the conquered people laboured at them. To construct such roads at the present day would be out of the question, for the cost of them would be prohibitive, no forced labour being available, as it was in Cæsar's day. Neither are such splendidly built roads necessary for ordinary country traffic. But, whilst we have been expending our energies and large sums of money in establishing an excellent railway system, we have most shamefully neglected our high roads. Time was when high roads and bridges were made, built, and maintained by the Government, and the main roads, at least, were kept in a good state of repair, because money could generally be found to carry out such public works, and to maintain them afterwards. The building of railways to the interior caused neglect of the main high roads. Coaches and wagons, bullock and horse teams being discarded for railway carriage, it was deemed no longer necessary to keep the road in repair. When the old road boards were done away with, there was no one to attend to the matter, and travelling by road became fraught with discomfort, damage, and danger. Nearly 100 years ago the United States Goevrnment was engaged in projecting and building extensive systems of public highways to develop the resources of the country, and probably that policy would have been continued but for the rapid growth of railway systems that seemed better adapted to the needs of the expanding business and the increasing traffic of the country. Within recent years there has been no adequate system for maintaining the highways in that country, and, as an American journal puts it, 'their condition in this age of general development is a disgrace to a civilised nation.'

"Now, an Office of Public Road Inquiries has been established through the Department of Agriculture, and this office is maintained by yearly appropriations from the public Treasury, resulting in great good in promoting road improvement, and there has been an increasing demand upon this office, not only for achieving aid, but for material assistance. In responding to the people's call for Government aid, there has been made a safe and healthy beginning, and the time is opportune for enlarging and extending the work in that country.

"In our State of Queensland the making and maintaining of the roads devolves upon the Shire Councils, who are empowered to levy rates for these purposes. In many parts of the country, such as in mountainous districts, as, for instance, in the Blackall Range and Main Range, and

PLATE 1.—A SCRUB ROAD IN THE MAROOCHY DISTRICT.

on vast stretches of deep alluvial or volcanic plains, such as the Darling Downs, the formation of good solid roads is beyond the means of the Shire Councils, whose funds have many other calls upon them. A great many necessary public works in the various shires have to be carried out by the aid of loans from the Government, but these loans have to be repaid, together with interest. If loan after loan is granted, and repayment deferred to the Greek Kalends, then it practically amounts to the work being done, as in olden times, by the Government. It was precisely to avoid this, that, together with other reasons, local government was established. The old system gave rise to many abuses, and easily obtained grants for local purposes were often diverted from the objects for which they were intended, and expended in some other direction. In some districts, the roads are a credit to any country, but when the highways are in such excellent order it will be found that the local conditions are all favourable to inexpensive, yet effective, road construction. The greatest trouble about roads exists in the farming districts, and in many of them roadmaking is limited to throwing up a heap of black soil and building culverts over the worst gullies. Metalling the black soil road is useless under such conditions, and the Shire Councils are not in a sufficiently flourishing condition financially to incur the great expense of properly 'building' roads over the rich alluvial plains. During a continuance of dry weather there is no trouble with the plains roads, unless it be in districts where they are badly cut up by timber wagons; but in wet weather travelling by wheeled vehicles is next door to impossible. A glance at the illustration on another page, of a road in the Maroochy district, will show the sea of mud and water the unhappy settler must struggle through to reach the railway. The worst roads in this State are, as stated, in the hill country and on the blacksoil plains. It is possible to ride or drive over the latter during heavy rains; but when the soil begins to be less saturated, travelling, if not impossible, is exceedingly hard on horses and bullocks employed in wheeled traffic. In the mountainous country the farmer has to contend with very steep gradients, as well as with deep, adhesive mud. In the Blackall Range the pioneers of settlement were the timber-getters. Their bullock teams drew the logs from the scrub by the nearest route, irrespective of steepness, as the road to the railway is all down-hill, and the teams returning with empty wagons were able to negotiate the steep bush tracks. When the farmer came along, however, to settle on these lands, the question of roads became a very serious one. But those responsible for opening roads for the farmers contented themselves with improving the old bullock tracks, by taking out a few stumps, cutting down a very bad sidling, leaving a road so narrow as hardly to allow two carts to pass each other. And even where the worst steeps were reduced by heavy cuttings, the gradient in several places is 1 in 2. We have only lately seen a bullock dray, empty, drawn by sixteen bullocks, stopped twice on one of these long, steep hills, to rest the animals. Those who are learned in the traction power of draught animals have proved, by incontestible figures, what actual force has to be expended by a horse in drawing a certain load on level and on steep

roads. It appears, by tables published by the Department of Agriculture of the United States, that a horse can exert a tractive force of 83·33 lb. for 10 consecutive hours at the rate of 3 miles per hour. This means that he can move a ton for 30 miles in 10 hours over a smooth, well-made gravel road. But taking a grade of 1 in 30 he can only move it 11 miles. If the gradient is increased to 1 in 10, he could only move it 5 miles. How far could he move a ton on such a road as we have described—*i.e.*, the road from Nambour to Dulong—where the gradients are so very steep? He could not move it at all. A settler at Mapleton has been bringing cedar in flitches down this range. His load, with four horses, does not exceed 600 feet. The distance is about 9 miles, and it takes the best part of two days to go and return. We do not enter here into the question of wear and tear on harness and wagon, which must be considerable. Then there is the loss of time to the driver. That is of as great importance as any other factor in the business. There are three ways of improving this state of affairs. The existing roads where these excessive gradients occur could be divided into sections of steep and level. If short level stretches were to succeed short pinches before the strength of a team is exhausted by a long pull, the cattle would be on level ground, and there recover breath and move easily on to the next short steep to be negotiated. Thus the top of the range would be reached in shorter time, and with greater ease to the cattle. The second plan is to abandon the road where these steeps occur and contour the ridges. There is a piece of country running below the pinches we mention, where a road could be carried in 2 or 3 miles, which would not have a gradient of more than 1 in 30, and which would, in even a shorter distance, reach the objective point beyond the ridges. This is only a single instance of many mountainous roads in the State which we could point out. The third and best way of overcoming the gradient difficulty is the narrow-gauge tramline. Such a tramline has now been built in this particular part of the range, and an 8-h.p. motor-car has taken a load of 5 tons up the range at the rate of 3 miles per hour. We believe that not even one ton has ever been taken before from Nambour to Mapleton by horse power and wagon.

"As for the black soil plains, the building of roads, as we have pointed out, is a matter of *naturæ locis*. Stone and gravel are plentiful in many parts of the Darling Downs, or of the Downs country of the Central and South-Western Districts, and where such is the case excellent roads have been constructed, as witness the road running from Warwick to Freestone and Swan Creeks. Many persons know that for a long time it was deemed impossible to make a road of any kind across Chat-moss, in England. Millions of tons of stone were emptied into it to form a road for the railway, only to be swallowed up in its bottomless abysses. Yet, to-day, the trains run regularly across this shaking bog. The roadway was made of fascines, on which the sleepers, rails, and ballast were laid, and the road is as solid and firm as if it ran over rock. Our blacksoil plains are not bottomless. But, if the top crust is broken, many more tons of broken metal would be required to form a firm road

than if it ran over a sandy plain. Here fascines would come in. The road could be formed, drains made on each side, the surface laid with fascines, as has been done in the case of the training walls at the Hamilton Reach of the Brisbane River, and on these fascines a firm roadway could be built. We propose to continue this subject of good roads for farmers, as it is one of vital importance to them, and we shall endeavour to throw all possible light on it, in the hope that eventually the proverb about dropping water wearing away a stone will be realised in the determined effort of all Shire Councils to provide easy means for farmers to bring their produce to the various railways.''

## RICE-GROWING AT BULIMBA.

That Uplands or Mountain Rice will thrive and yield heavy crops on the coast lands of Queensland from the Southern border to the Far North at Cairns has long ago been proved. At one time the industry was carried on profitably in the South, in the Pimpama, Logan, and Albert districts, where a rice mill was erected by Mr. W. Heck, which treated all rice grown in the neighbourhood. The crops then grown with only fair cultivation yielded from 30 to 40 and up to 60 bushels of paddy per acre, which sold at from 4s. to 5s. per bushel delivered at the mill. Besides the grain, the straw, which is less hard than and compares favourably with oaten straw, yielded from 3 tons to 4 tons per acre, according to the variety grown, of a value of from £2 to £3 per acre. Thus a six months' crop of rice gave the grower an average of £15 10s. per acre. In favoured districts free from frost, as in North Queensland, two crops can be obtained in the year. The price of rice at the time was from £19 to £24 per ton, which gave the local miller a fair margin of profit if he sold at £18 per ton. To produce a ton of marketable rice, 1 ton 10 cwt. of paddy is required to be milled of a value of over £12, and the miller's profit was £3 10s. per ton. The question of labour does not enter largely into rice cultivation. The land is prepared in the same way as for wheat, and the seed may be sown either broadcast at the rate of 60 lb. of paddy per acre, or, what is preferable, in drills 2 ft. 6 in. apart, with 10 in. between the plants by means of an automatic seed sower. Rice has usually been harvested with the ordinary sickle in the districts named. It is then left for a day or two to ripen, when it is carted to the barn for stripping and thence to the mill.

Owing to the spread of the sugar and dairying industries, the cultivation of this profitable crop was neglected, but the facts remain as above stated.

In proof of what can be done in rice-growing, we have received from Mr. C. F. Dennis, Hawthorn road, Bulimba, near Brisbane, a sheaf of rice here depicted:—

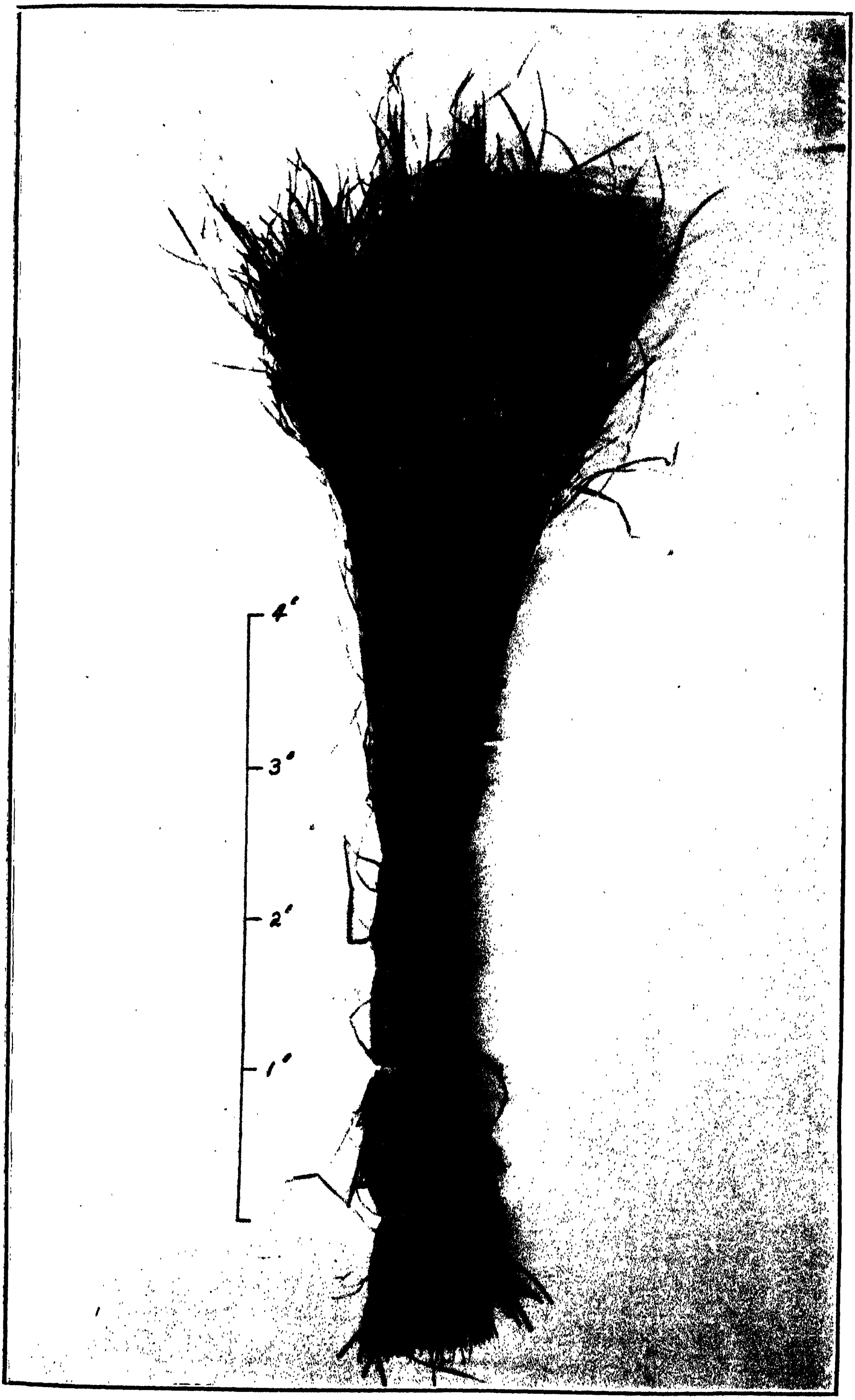



PLATE 2.—RICE GROWN AT BULIMBA.

It was grown on alluvial soil at the foot of a hill; depth of surface soil, about 2 ft., with a subsoil of pipeclay. The area planted yielded at the rate of 60 bushels per acre; the heads were well developed and the straw from 4 ft. to 5 ft. high. The seed was obtained from a local seedsman (Mr. T. H. Wood), and germinated freely. The straw is much finer than that of oats, with which it compares favourably for chaff. The crop was sown on 10th January, 1914, and harvested on 8th May of the same year, the sample here shown having been cut about 6 in. above the surface of the ground.

## TANIAS; OR, DASHEENS.

We have received from Mr. B. Harrison, F.R.H.S., &c., of Cudgen Park, Burringbar, N.S.W., the following paper on the "Dasheen," described as a new vegetable. Those of our readers who are in possession of the "Queensland Agricultural Journal" for September and November, 1906, will find therein a full description of the Dasheen, which is grown in the West Indies, also in Mexico and tropical parts of South and Central America. The vegetable is said to be principally grown in localities where the English potato will not thrive. We have not found any disposition on the part of our farmers to take up the cultivation of this vegetable, which is not to be wondered at seeing that in almost all parts of the State the English and sweet potato, as well as yams, thrive well. Those who take an interest in the cultivation of new food plants will read with interest Mr. Harrison's remarks on the "Dasheen," or Tania:—

PLATE 3.—DASHEENS (TANIAS).

"This belongs to the family Calocasia, and the leaves are shield-shaped, resembling taro, and when fully grown attain the height of 4½ ft. to 6 ft. The tubers in the raw state contain the same acrid principle that characterises most other plants of this family, and should never be tasted raw. In cases of the accidental tasting of acrid tubers or leaves, lemon juice in a little water is found to alleviate the ill effects. The dasheen corms (central plants) and tubers are similar to the potato in composition, but they contain less water, and in consequence the content of starch, as well as of protein, is roughly one-half higher than in the potato.

" In addition, they possess a very agreeable nutty flavour. It is said that remarkable digestibility has long been attributed to the acrid tubers, and in Hawaii, as well as in other countries where they are grown, their use for invalids is often prescribed. The starch grains of the taro and

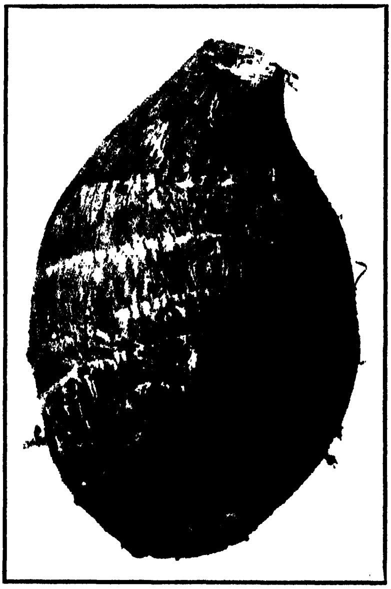


PLATE 4.—DASHEEN (TWO-THIRDS NATURAL SIZE).

dasheen are among the smallest in all food plants, and this is thought by some to account partly for the ease of digestion. An average of eleven analyses by the United States Agricultural Department of the dasheen gives 27⅗ per cent. of carbohydrates (starches and sugars) and 3 per cent. of protein. For the white potato the generally accepted figures are 18 per cent. of carbohydrates and 2·2 per cent. of protein. The sweet potato approximates the dasheen in carbohydrates, but is even lower than the white potato in protein. The dasheen requires rich sandy soil, very moist, but well drained; and a brief flooding or immersion will not injure the crop. Any low-lying sandy land that is fairly well-drained, but which is too wet for general field crops, can be used to advantage, but it would be advisable to plant on ridges. Tubers of 3 oz. to 5 oz. in weight are used for planting, from 2 in. to 3 in. deep, in hills 3 ft. apart, the distance between the rows being 4 ft. The crop matures in about seven months. Where the conditions are favourable, dasheens will produce from 6 lb. to

10 lb. or more per plant. The tubers are formed in a compact cluster, with smaller ones attached to and around a central corm, which sometimes weighs up to 5 lb. These are also excellent when baked, and they can also be converted into flour for soups and gruels, and when mixed with ordinary flour it makes delicious pancakes, biscuits, and bread, which do not become heavy by standing. The nutty flavour of the tubers gives them an advantage as food that would seem to make the plant, when compared with the potato, an even more valuable food producer. The young blanched shoots of the dasheen make a very delicious and tender vegetable, and are used much like asparagus. The flavour is delicate, and is suggestive of mushrooms. The first crop of shoots, when forced, is usually ready for cutting within 35 or 40 days after planting. From 6 to 10 cuttings can be made at intervals of 10 to 14 days, depending upon temperature and the size of the corms, or plants, used. The shoots will keep well for several days if in a cool, dry place."

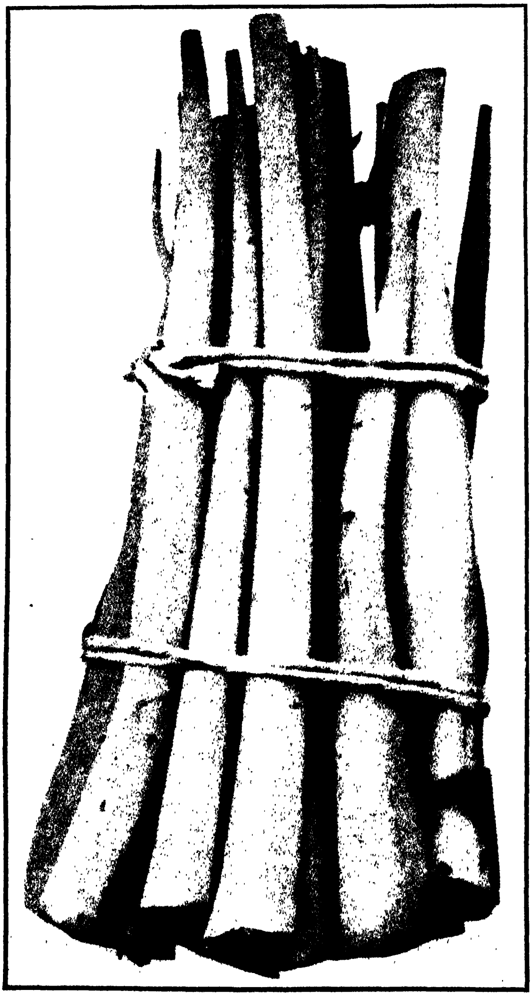


PLATE 5.—FORCED DASHEEN SHOOTS.

## THE USE OF EXPLOSIVES IN FARMING.

Gradually, but surely, the substitution of dynamite for clearing land of trees and stumps, and for subsoiling lands which are becoming exhausted with constant cropping for horse and hand labour, is becoming understood and adopted by many farmers, orchardists, and sugar planters. Thorough preparation of the soil by deep cultivation is an essential point in Agriculture, the object being to bring the lower strata in contact with the air and warmth and to regulate the conditions of moisture. Soils which have been cropped year after year, in time, fail to produce satisfactory crops, except at heavy expense for manures—artificial or natural. Such soils are erroneously said to be exhausted, but the real fact remains that, although the ingredients which have built up the plants have eventually been removed by successive crops, they are still present, but out of reach of the roots of the plants, and, in order to make them available, they must be brought up in some way or another. This has for generations been done by the expensive method of subsoiling by horse labour, and, later, by traction-engine power. Let it be borne in mind that the difference in yields between fertile and so-called "exhausted" soils is not due to a difference in the supply of available plant nutrients, but, as was proved by experiments made by the Bureau of Soils of the United States Department of Agriculture, to the presence of something deleterious to the plant's growth; and this was corroborated by exhaustive experiments, in which it was conclusively proved that unproductivity of the soil was due to a poison, and the Bureau found out these poisons, determined their qualities, and identified them. One was "tyrosin," a substance found in green manure; the other was "cumarin." It was found that pure water when impregnated with tyrosin, even to the small degree of 50 parts to a million parts of water, killed wheat seedlings outright, and that they thrived in proportion as the quantity of tyrosin was diminished. To get rid of these poisons, it was considered by the American scientists that a systematic rotation of crops was the true remedy.

Every farmer knows that by constant ploughing of the land a hard pan forms below the depth to which the soil has been turned up, and, in the case of land which has been cropped year after year without breaking up the subsoil below the surface, this lower stratum becomes harder, more solidified, and more impervious to moisture; but it is this very subsoil which contains as many elements of mineral plant food as were originally in the fertile surface soil, and all that is needed is to make them available by some means or other. Obviously, a great saving in artificial manure is made if the subsoil, which, as said, contains plenty of valuable plant nourishment, is treated in the same way as the surface layer. This is most successfully accomplished by blasting the soil without bringing the substratum to the surface. The blast breaks up the ground, opens and thoroughly shatters the subsoil so as to admit air and warmth, and the shattered soil, being now porous, will conserve moisture and properly drain the surface, thus causing fresh fertility.

REGULATING THE MOISTURE IN THE SOIL

is of the greatest importance, for scientific agriculturists have discovered that water is the most important element in plant growth. It is not at all necessary, as some suppose, that the root of a plant shall come in actual contact with the plant-food elements, for plant roots have the power of drawing from the surrounding soil the necessary food—provided that soil permits of the passage of such food. Water or moisture is the carrier of the plant food through the soil and into the plant roots. Therefore, a porous, loose soil is of vital importance for a sufficient food supply to the plants, and this is obtained in a prominent degree by the action of an explosive on the subsoil. The yields of the crops from blasted soil being exceptionally large prove the value of soil-blasting. As all agriculturists and pastoralists know, impervious strata make land practically valueless. In wet weather they hold the water in such quantities that the roots are drowned or rot away, and in dry weather such land does not retain the moisture and the vegetation dies off quickly. Such land can be rendered fertile by blasting. The hard pan is completely broken up, the water-storing capacity is increased, and the dry, dead topsoil is converted into rich land.

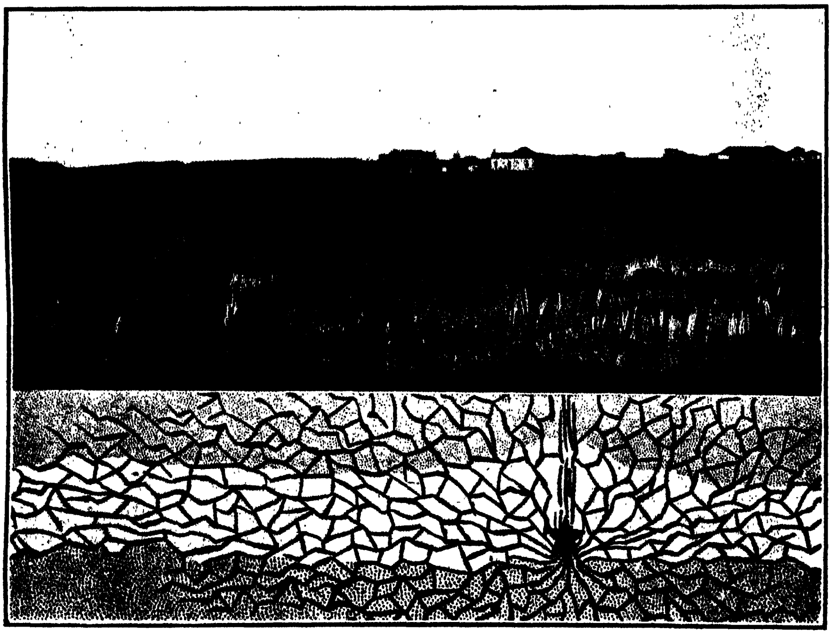



PLATE 6.—BLASTED HARD-PAN, WITH SECTIONAL VIEW OF SOIL.
1. Surface Soil. 2. Hard-pan. 3. Subsoil.

Deep ploughing is of great advantage where a layer of sand is on top of a layer of loam. Now, to make this valuable loam accessible for the plant roots, it is necessary to turn the soil over with the spade or fork if it cannot be reached with the plough. This is a labour which is expensive and which takes much time; hence useless to any but owners of small

vegetable gardens. On a field scale, blasting will perform the work effectively and economically, securing a perfect shattering and mixing of the soil.

## HOW THE WORK IS DONE.

The operation of subsoiling with dynamite was well demonstrated on 26th May last, by Mr. T. J. Doolan (M. Aus. I.M.E.), representative of Nobel's Hamburg Explosives Company, and his colleague, Mr. Hand, at the Penal Establishment at St. Helena. The cultivated land on the island was, and much still is, of surpassing richness, as evidenced by the heavy field crops which have been produced there for over thirty years. On the invitation of the Comptroller of Prisons (Captain Pennefather), Messrs. Doolan and Hand, together with a few others interested in the matter, went to St. Helena, where all arrangements had been made by

PLATE 7.—MR. DOOLAN AND SOME OF THE VISITORS.

the Superintendent (Mr. J. Ryan) to enable the work of blasting to be commenced immediately on arrival of the Comptroller and the visitors. A piece of land had been chosen for the demonstration which had, after many years, begun to produce such poor crops as to necessitate its being thrown out of cultivation or treated in some manner, other than merely manuring, by which its fertility might be restored. This is what Mr. Doolan proposed to show the feasibility of.

The subsoil had become solidified, the only loose soil consisting of about 6 in. or 8 in. of the surface.

The first proceeding was to examine the soil depth, and thus fix the depth for the blast holes; and for this purpose two holes about 3 ft. apart were made with a sharp-pointed $1\frac{1}{4}$-in. steel bar to a depth of 2 ft. 6 in. In each hole was placed one stick of dynamite with detonator and fuse attached, and slightly tamped with a wooden tamping rod. When these

charges exploded there was only a slight disturbance of the surface; but when the loosened soil was dug out it was found that the subsoil had been shattered to a depth of over 3 ft.

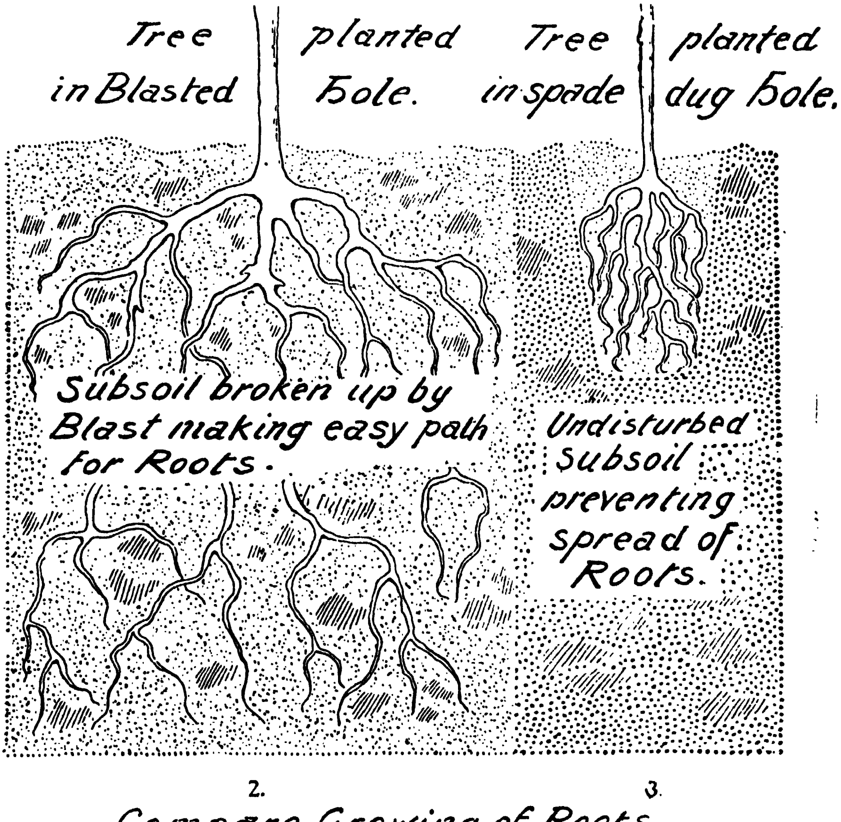
PLATE 8.—VISITORS STANDING OVER A CHARGED HOLE, AWAITING THE EXPLOSION.

The proper depth for the placing of the charges having thus been ascertained, pegs were put in at a distance of 4 ft. to 5 ft. apart in a slanting position. Then the holes were made with the bar, and, as each

PLATE 9.—DEEP BLAST, WITH SIX PLUGS OF DYNAMITE.

charge was placed and tamped, the peg was placed upright to show that the hole was charged. Some thirty of these were charged with a stick of dynamite, with a half-stick of gelignite in which the detonator with fuse

attached was placed above it as a primer and very slightly tamped. Then thirty more holes were charged with gelignite. As soon as all was ready, Mr. Doolan and Mr. Hand went along lighting the fuses; and before all were lighted the explosions began, but so little was the surface soil disturbed that the operators went on with their work unconcernedly. When the last of the blasts had gone off, the area operated on (about 1/8-acre) showed little disturbance of the surface soil. To show, however, how holes could be opened for planting trees, six sticks of dynamite were placed at a depth of 3 ft., and six of gelignite at the same depth.




Compare Growing of Roots.

On this occasion the visitors were requested to move off to some distance. After the explosion, which blew masses of soil into the air, there appeared two gaping holes in the soil, which was completely shattered to a depth of 4 ft. Examination of the other parts of the blasted area showed that all the subsoil between the holes was completely loosened to about the same depth. At the conclusion of the demonstration, the visitors were invited to stand over a charged hole, and several accepted with some trepidation as they were told to stand right over the lighted fuse. When the charges exploded, the only result was that a slight underground shock produced a pleasurable tingling sensation in those standing over the charges.

This demonstration was completely successful as regards the subsoiling. It was then arranged that two areas of the same dimensions should be marked off before planting maize next September, a space of several feet being left unplanted between the blasted area and that portion not dealt with. Accurate notes will be taken as the crop grows, and results compared when harvested.

Samples of the soil were taken from a depth of 4 ft., also of the medium and top soils, which were sent to the Agricultural Chemist for analysis. Another analysis will be made after the crop is harvested.

The agency in Brisbane and other towns of Queensland for Nobel's Hamburg Explosives is in the hands of Messrs. Burns, Philp, and Co., from whom all information on the subject of the use of explosives in clearing land, farming, tree-planting, &c., may be obtained.

## THE COST OF SUBSOILING WITH EXPLOSIVES.

Since the demonstration given by Mr. Thomas J. Doolan, at St. Helena, of the value of explosives in subsoiling, that gentleman has forwarded to us (through the agents, Messrs. Burns, Philp, and Co.) the following estimate of the cost of the work on land in a similar condition to that at St. Helena. He says:—

"Taking an area of 10 acres, and putting down 600 holes 18 in. deep to the acre, and using a full cartridge, one detonator, and 18 in. of fuse for each hole, it will work out something like this:—

Cartridges per case, ¾-in.—60 per packet, or 600 per case.

| | £ | s. | d. |
|---|---|---|---|
| Ten cases, 6,000. | | | |
| Cost, Brisbane, 46s. per case .. .. .. .. | 23 | 0 | 0 |
| Detonators at 36s. per 1,000, for 6,000 holes .. .. | 10 | 16 | 0 |
| Fuse, at 6d. per 24 ft., using 9,000 ft. .. .. .. | 9 | 7 | 6 |
| Total .. .. .. .. .. .. | £43 | 3 | 6 |

This is about £4 6s. 3d. per acre, only estimating the cost of explosives. Labour must be taken into consideration. I think three men could easily drill, charge, and fire 2,000 holes per day; allowing 8s. per day each man amounts to £3 12s. for three days' work doing 10 acres and firing 6,000 holes. . . . I am estimating for cleared land similar to St. Helena; and were I to undertake subsoiling 10 acres there, I do not think I would put down more than 450 holes per acre, equal to about 10 ft. by 10 ft., as I could put the holes down to better advantage than one not used to the work. However, I think I have given you some distinct data to work on, and at the same time remember that circumstances and conditions of country to be operated on change from time to time. I have based the above estimate on St. Helena country only. . . . It may be that for orchards already planted, say, 15 in. by 15 in., and subsoiling as per diagram in our pamphlet, the cost would be considerably less, one hole to every four trees being all that is necessary; the acreage being easily worked out, an estimate can be given for the work. . . . Furthermore, a smaller quantity of dynamite may be used in some places—perhaps half a plug, which would reduce the cost a lot."

# DEPARTMENT OF AGRICULTURE AND STOCK.—SEED MAIZE FOR DISPOSAL FOR SEASON 1914-15.*

It is a well-known fact that good typical seed corn of a recognised variety is hard to procure, and that rapid deterioration in type and yield of grain soon follows when care is not exercised in seed selection. This feature is only too applicable to maize on account of the manner in which fertilisation is effected naturally, and to the susceptibility of the plant to hot winds and to any lack of moisture when "tasselling" or during subsequent development.

Our coastal belt and the districts lying adjacent to the Main Range are so favoured in the matter of rich soils and by the climate that, in anything like an average season, the output of grain bids fair to assume large proportions.

The standardisation of the Queensland-grown article is rendered somewhat difficult on account of the diversity of soils and conditions under which the crop is produced, but it is safe to assume that insufficient cognisance is still taken of the means of improving existing varieties either in type or productivity.

For some seasons past this Department has made a practice of importing seed from the corn-growing belt in the United States of America, and elsewhere. Considerable trouble has been taken to secure varieties which have excelled in competitive trials extending over a series of seasons. Latterly the practice of establishing seed-propagation plots in well-known maize-growing districts throughout this State has been adopted; and at these a system of selection and of topping and tailing the ears, conforming to a recognised standard of type and quality for each respective variety, has enabled the Department to offer seed of the varieties noted hereunder, at 8s. per bushel, delivered to the railway station nearest to where the applicant resides. Persons served by steamer trading to recognised ports, and thence by rail, will be entitled to the same privileges.

Delivery will be made about the latter end of August. Orders should be addressed direct to the Under Secretary for Agriculture, Brisbane, and be accompanied by remittance (exchange added).

The quantity of seed grain which will be supplied to each individual applicant will not exceed 3 bushels, and orders will be filled according to priority of application. In the event of orders exceeding the available supply of any one variety, the right of substituting another is reserved; if the arrangement is not acceptable, notification to this effect should be made when ordering.

Varieties available—

Golden Beauty, Hildreth, Hiawatha Yellow Dent, Yellow Dent, Reid's Yellow Dent, Early Leaming, Red Butcher.

*Summary.*—Maize yields are so influenced by seasonable differences that no single variety can be said to enjoy a monopoly in this respect. The "strain" or "breed" of grain is all important; and where a

* Compiled by H. C. Quodling, Agricultural Inspector.

variety adapts itself to local conditions, and proves that it possesses the attributes associated with a high-yielding, marketable grain, this standard can only be maintained by an exclusive system of selection.

It is generally recognised that quick-maturing and lighter-yielding varieties are better suited to the poorer classes of soil and to localities which are less favoured in the matter of rainfall, whilst the slower-maturing kinds favour richer soils and require a more generous rainfall, but are capable of affording correspondingly heavy returns.

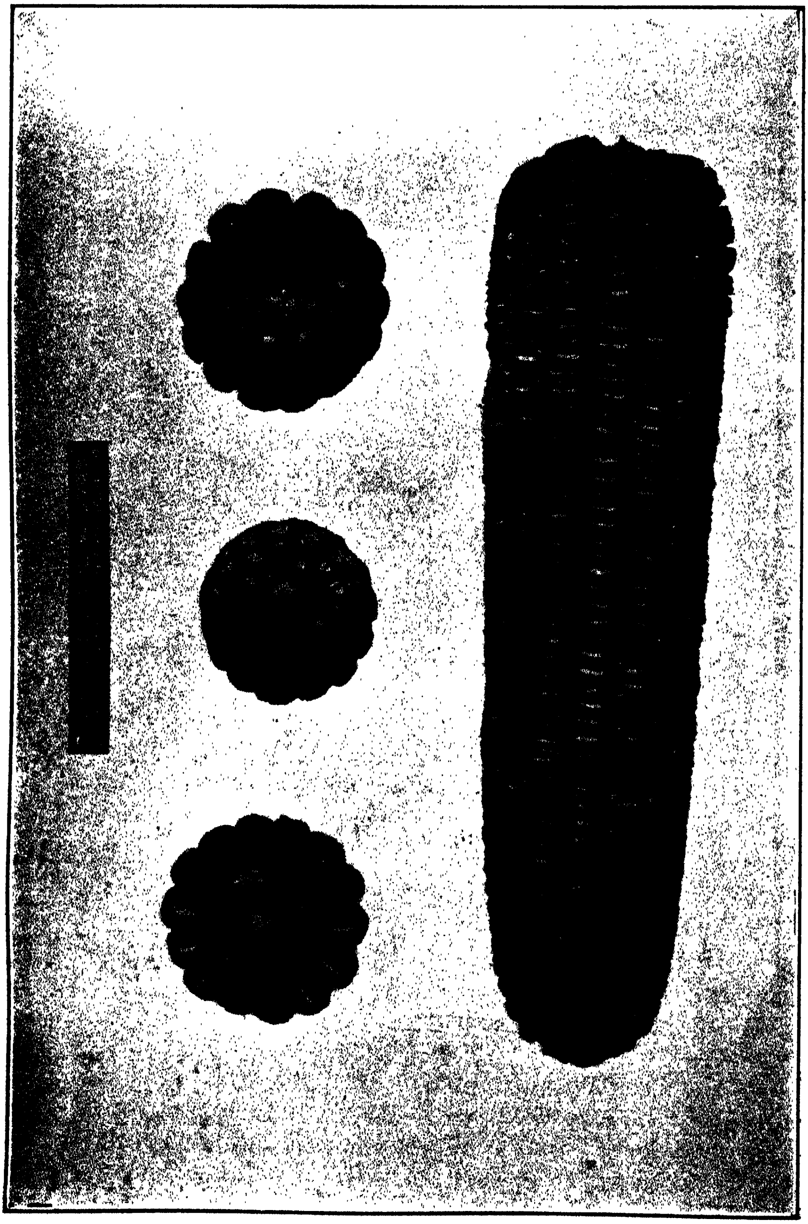


PLATE 10.—TYPICAL EAR OF "GOLDEN BEAUTY" MAIZE.
(Slightly under natural size.)

Successive seasons always present dissimilar features, but data of averages go to prove that, other factors being favourable, the surest crops and the most satisfactory yields are obtained when the rainy and tasselling seasons synchronise.

## CHARACTERISTICS AND NOTES ON INDIVIDUAL VARIETIES.

*Golden Beauty.*—The seed available has been raised from a direct importation made last year. The variety has been grown in the State for several years, and gave good results at the Biggenden State Farm on the forest soils there. It is a strong-stalked and fairly hardy variety, and takes about four and a-half months to mature.

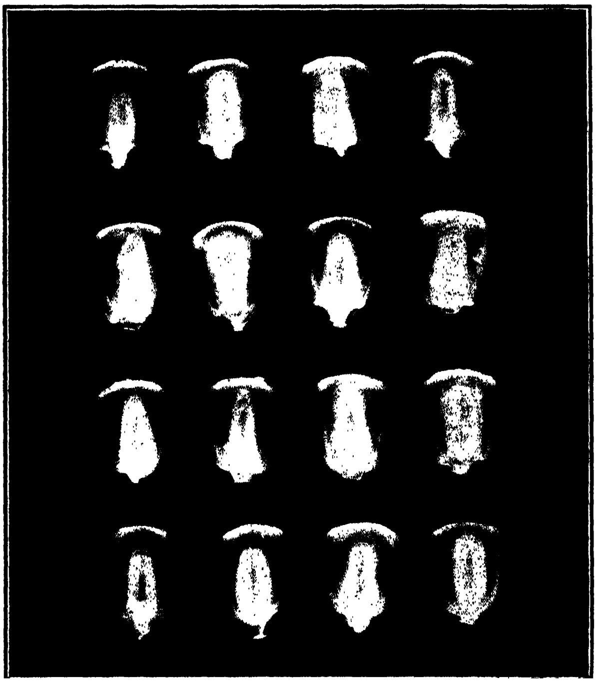


PLATE 11.—TYPICAL GRAIN OF "GOLDEN BEAUTY."

The ears are of medium size, with a somewhat stout red core. In shape they are slightly tapering from base to tip. The rows of grain, usually fourteen in number, are set firmly on the cob; owing to the characteristic shape of the grain (flat brick shaped), with a slightly rounded shoulder, the furrows between the rows are a pronounced characteristic. The grain is of medium size, robust dent type, and of moderate depth; in texture it is horny in character, reddish amber in colour with a distinct yellow cap, carrying a small amount of crown starch. The ears turn down as they approach maturity, and are covered with a light " husk."

PLATE 12—"HILDRETH" MAIZE.
(Showing habit of growth.)

*Hildreth.*—Grown for seed imported in 1910. The variety originated in Kansas, U.S.A., and has proved to be one of the heaviest and most consistent producers in that State, excelling in yield all the other varieties grown over a series of seasons at the experiment station, and

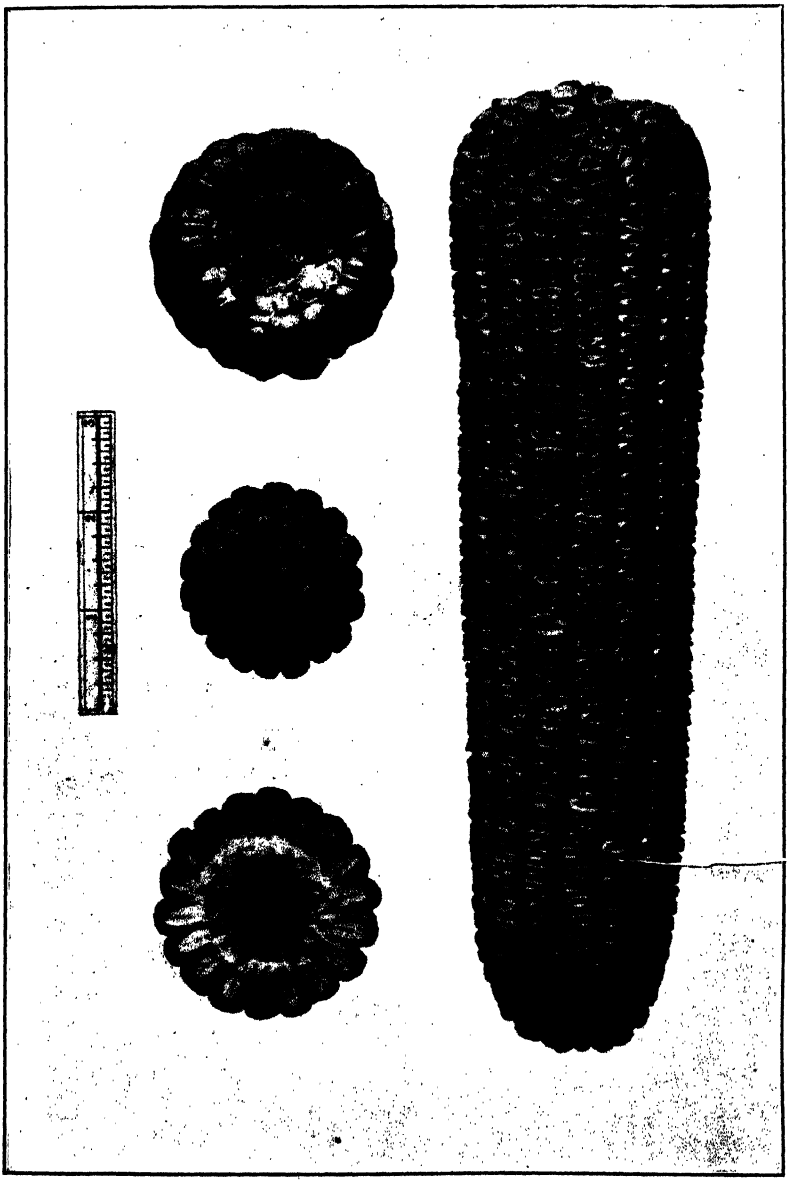


PLATE 13.—TYPICAL EAR OF "HILDRETH" MAIZE.
(Slightly under natural size.)

it is credited also with winning many of the premiums at the corn shows there. Since its introduction to Queensland it has given large returns when grown on the rich scrub soils of the Kingaroy district, and produced 70 bushels per acre last year.

It is a late-maturing corn, taking about five months to mature. The stalks are inclined to be tall and strong—growing on fertile land. Two ears are usually found to a single stalk; these are carried fairly high up on a somewhat short shank. The husk is, if anything, a little short, and this induces a tendency to expose the tip of the ear. Ears are fairly large and stout, cylindrically-shaped up to a point about two-thirds of their height, and then tapering.

The rows of grain are numerous, running from about 18 to 20; these are packed very closely together. Grain is of the dent type, square-shouldered, wedge-shaped, somewhat narrow, and deep; in colour it is a deep yellow; the crown of the grain has an inclination to roughness. The variety possesses the attribute claimed for it—productiveness; but rich soils and a good rainfall are essentials.

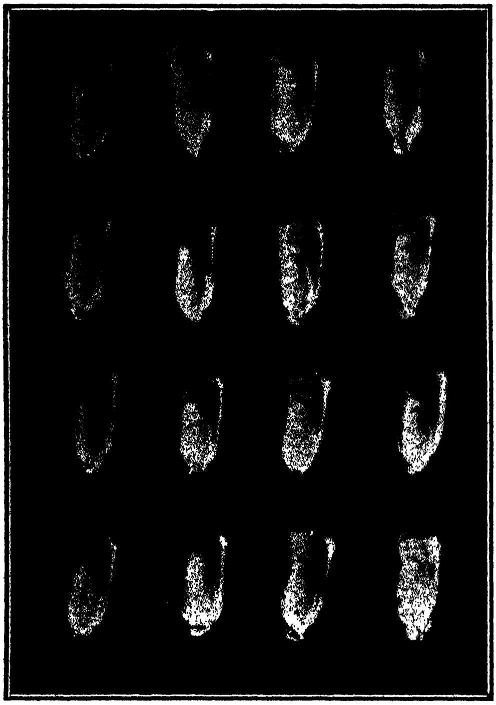


PLATE 14.—TYPICAL GRAIN OF "HILDRETH."

*Hiawatha Yellow Dent.*—Grown from seed imported last year. The history of this variety credits it as originating in Illinois, U.S.A., twenty-five years ago, when it was then known and exhibited as Mammoth Yellow Dent, and won a 500-dollar premium. Its slow-maturing habit induced Mr. Ziller, of Hiawatha, Brown County, Kansas, to cross it with a quicker-maturing variety, "Legal Tender," and select for a very deep kernel and well-developed ears. In 1906 this breeder secured the premium for the best ten ears of yellow corn at the Kansas State Corn Show.

PLATE 15.—"HIAWATHA YELLOW DENT" MAIZE.
(Illustrating manner in which the ears turn down as they reach maturity.)

This variety is a strong grower, and takes about five months to mature. Two large, fairly uniform ears are generally produced by each stalk; these are borne on a long shank. The ears are well covered with "husk," and turn down as they approach maturity; this characteristic stamps the variety as a most suitable one for wet districts.

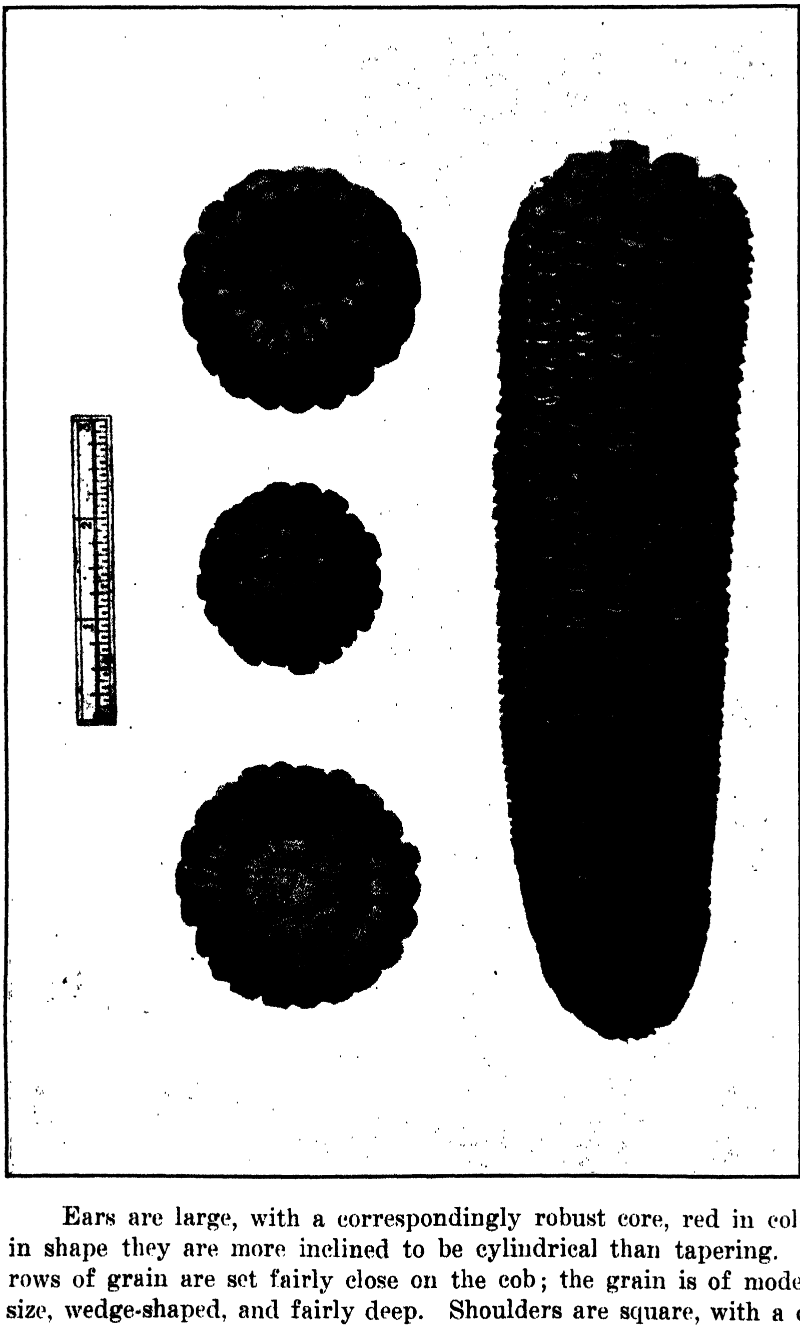


PLATE 16.—TYPICAL EAR OF "HIAWATHA YELLOW DENT" MAIZE.
(Slightly under natural size.)

Ears are large, with a correspondingly robust core, red in colour; in shape they are more inclined to be cylindrical than tapering. The rows of grain are set fairly close on the cob; the grain is of moderate size, wedge-shaped, and fairly deep. Shoulders are square, with a deep

indentation and an inclination to roughness on the crown. Colour, medium yellow. The grain is of medium hardness, and inclined to carry crown starch.

This is a prolific variety, and should prove an acquisition for fertile districts where a good rainfall exists.

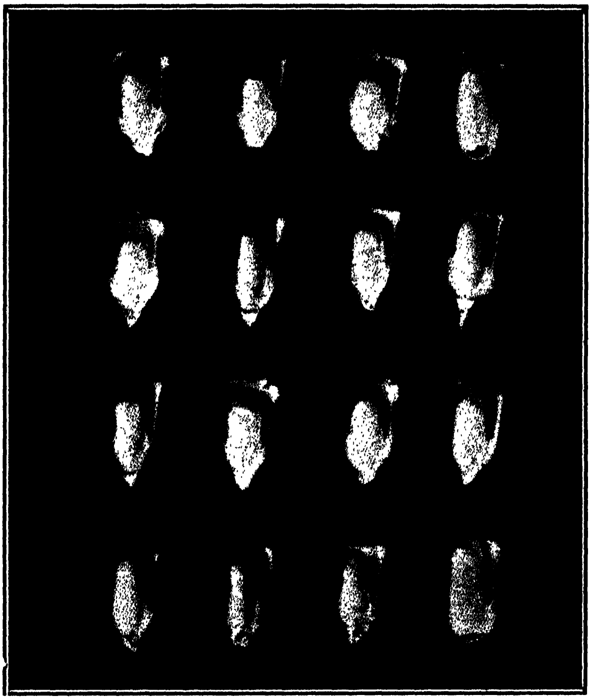


PLATE 17.—TYPICAL GRAIN OF "HIAWATHA YELLOW DENT."

*Yellow Dent.*—This strain has been raised from seed originating from the United States of America, and has proved itself to be of a hardy character here, and a good yielder. It is stout-stalked, of medium height, and takes from four and a-half to five months to mature. The ears are borne fairly erect on a short shank, and are well protected by the husk. In shape they are inclined to be cylindrical, and of medium size with a core of similar thickness.

The grain is of a characteristic yellow, wedge-shaped, and fairly deep, with a leaning towards a rugged pinch-tip, found in so-called horse-tooth corn. It is of medium hardness, but carries a fair proportion of soft crown starch; is a suitable class of grain for feeding whole. This is a useful variety for coastal and scrub districts where good rainfalls are experienced.

*Reid's Yellow Dent.*—Grown from seed imported from the United States of America last year. This is regarded as a standard type in the "States," its origin dating back sixty-seven years. The breeders of the corn—Robert Reid and his son James—are credited by American

authorities with the production of the purest and most highly-bred corn extant. The celebrity which this variety has attained is said to be due to its cosmopolitan character, enabling it to adapt itself readily to a new environment.

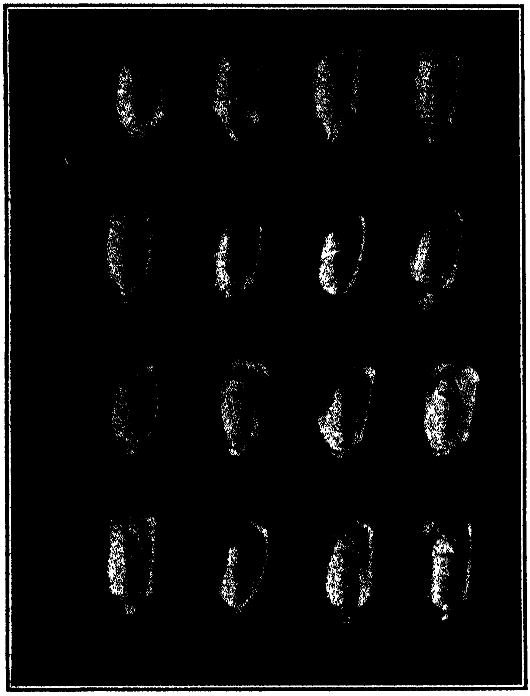


PLATE 18.—TYPICAL GRAIN OF "REID'S YELLOW DENT."

The stalks are of medium height and thickness, and carry rather over the average amount of foliage. The crop takes about four and a-half months to mature.

Ears are even, of medium size and cylindrical, and enclosed in a light husk. The rows of grain are closely packed, and evenly paired on a red core. The grain is only of medium size, square-shouldered, blunt, wedge-shaped, slightly flattened at the tip, of medium width, and moderately deep, carrying a characteristic dent; in colour it is pale yellow at the crown on an amber base. The texture is of medium hardness, showing a distinct horny layer and a relatively small proportion of crown starch.

This is a valuable variety for general cultivation throughout the corn-growing districts of the State, and its characteristics give rise to the opinion that where "Early Leaming" is successful this should also thrive equally as well.

*Early Leaming.*—Two strains are on hand—one raised from seed imported in 1910, and the other last year. This is the oldest named variety of maize in America, and was originated in Ohio by Mr. J. S. Leaming in 1826.

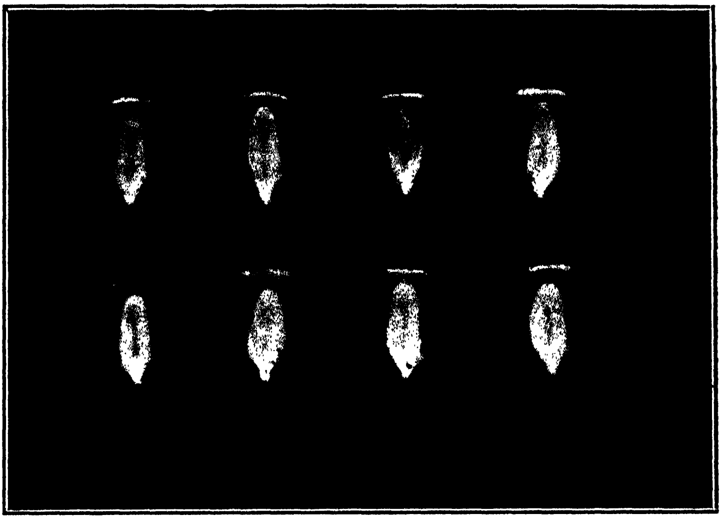


PLATE 19.—TYPE OF "EARLY LEAMING" GRAIN (RAISED FROM SEED IMPORTED, 1910).

The original was said to be a large late-maturing yellow corn, selections being made from this until an early-maturing uniform type

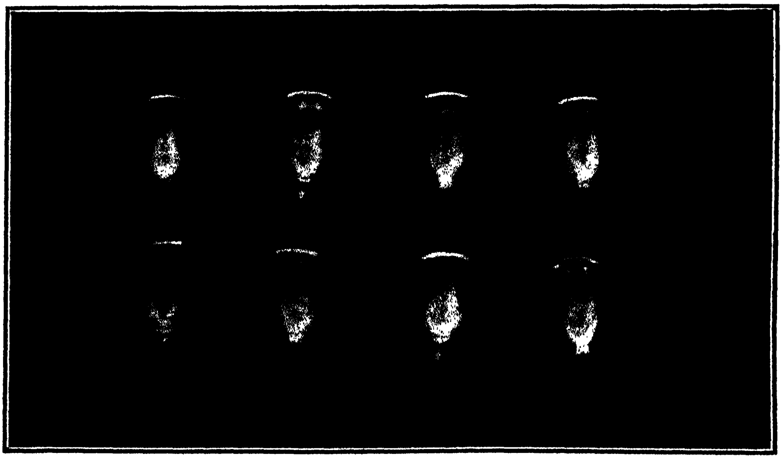


PLATE 20.—TYPE OF "LEAMING" GRAIN (RAISED FROM SEED IMPORTED, 1913).

was established, conforming to a regular-tapering ear with blocky kernels of medium depth and simple dent. The present-day type takes about four months to mature, and favours a stalk medium in height and thickness, with a freedom from suckers. The ears are of moderate length, tapering, and with evenly disposed rows of grain

borne on a red core of medium thickness. The grain is rather under medium size, square-shouldered, wedge-shaped, flattened on one side, and with an inclination to be a little square at the tip; the crown is slightly indented, medium yellow in colour merging to a smooth, polished-looking amber. In texture the grain shows a relatively high proportion of horny starch with a thin cap of crown starch.

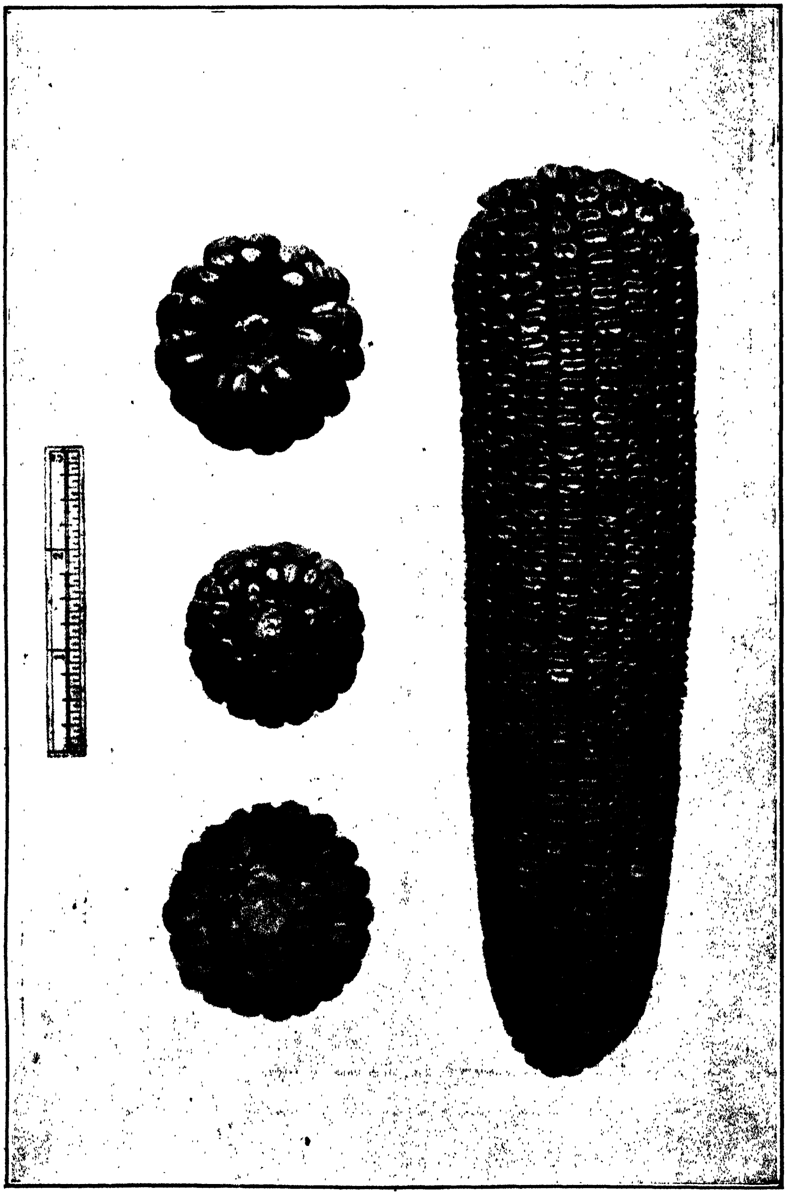


PLATE 21.—TYPICAL EAR OF "EARLY LEAMING" MAIZE.
(Slightly under natural size.)

Importations of "Leaming" have been made by the Department for a number of years. Excellent returns have been recorded from time to time, giving rise to the opinion that it is difficult to name any variety

superior to this for general cultivation in districts situated away from the coast, but still within the corn belt.

*Red Butcher.*—Grown from seed imported from the United States of America last year. In the States the name of the variety has a sanguinary prefix which has been altered to the present title.

For three years at the Kansas Experiment Station, 1907-1909, this was one of twelve varieties which averaged over 50 bushels per acre. The crop matures in about four months; the stalks are of medium height and thickness. Ears are slightly tapering, of medium size and robust-

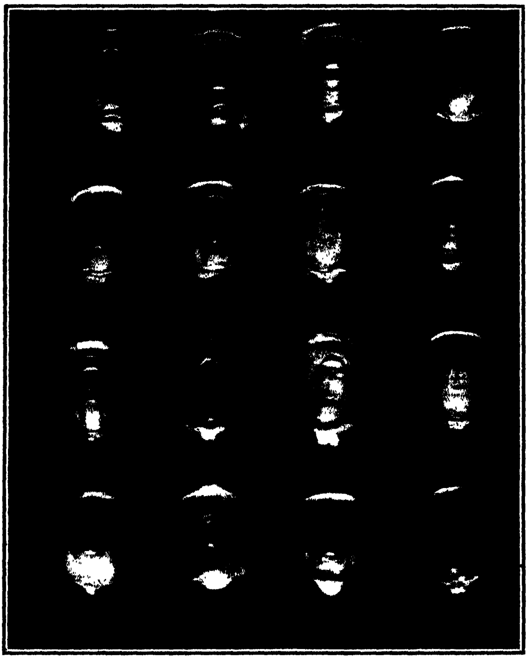


PLATE 22.—TYPICAL GRAIN OF "RED BUTCHER."

ness. The grain is broad and flat. and, except for its characteristic rounded shoulder, is brick-shaped; fourteen to sixteen rows to the ear are the rule, the shape of grain resulting in fairly pronounced furrows between the rows; the colour is blood-red with a pale cream and red-coloured indentation on the crown. In texture, the outside layer is thin and horny, with a relatively high proportion of soft internal starch. The variety has been introduced with the object of supplying a medium-early class of grain to take the place of "Red Hogan," the excellent characteristics of which seem to have been submerged by intermingling with inferior types.

# MARKET GARDENING.

## NOTES ON RHUBARB-GROWING.

Now is the time to plant rhubarb, which may be grown on almost any well-drained soil; but a rich deep loam yields the best product—the richer and deeper it is, the quicker will be the growth. The bed ought to be trenched to a depth of 2 ft., and very heavily manured with good stable manure mixed with cowyard manure.

To grow the plants from seed, a well-manured seed-bed should be prepared, and the seed sown in August or September, in drills about 1 ft. apart. The young plants will require plenty of water in dry weather, and a light shade will also be beneficial to their growth. Thin out the plants to about 6 in. apart, and let them remain in the seed-bed until the following spring, when they can be transferred to the permanent stand. The rows should not be less than 4 ft. apart, and the plants at least 3 ft. apart in the rows. During the first year the space between the rows may be utilised for growing lettuce or any other low-growing vegetables, but after that the plants will require the whole of the room for their full development. The ground should be kept well cultivated and free from weeds, and all flower stalks should be cut off as soon as they appear, in order that the plants may not exhaust themselves by forming seed.

In the winter of each year a heavy top dressing of coarse manure should be applied, and this must be carefully forked in in the spring, care being taken that the roots are not broken or disturbed in any way. No stalks should be used until the second year, and if left until the third the plants will be all the better. No plant responds more liberally to judicious watering than rhubarb, and in dry weather irrigation gives surprising results in the way of increased yield and general vigour of the plants. Water should be vigorously used when necessary, but at the same time it is well not to overdo it, and thus make the ground sodden. Liquid manure, applied occasionally, is also of great benefit.

Instead of raising the plants from seed, which is a rather slow process, it is often more convenient to plant "crowns"—that is, roots—one or, preferably, two years old. These, planted in the same manner as the seedling, when set out in permanent beds, come on very quickly. Such crowns, if planted in July or August, begin to grow at once, and in September or October the stalks from them are ready for use.

By purchasing crowns, therefore, you can have rhubarb fit to use in two months instead of having to wait for two years for seedlings to come to maturity. It will be found more profitable to purchase strong sturdy crowns, and renew them every third year, than to go to the trouble of raising seedlings, which will probably not be very strong or vigorous.

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## TOMATOES.

The tomato, being a gross feeder, the soil in which to grow it can hardly be too rich, especially in lime, potash, and phosphoric acid. A perfect tomato soil is a rich sandy loam, well drained, deeply dug or ploughed, and subsoiled. Sow the seed in August or September; and

when the plants are about 6 in. high, thin them out to about 3 ft. apart, and put up a light trellis to train them on.

The plants which have been taken out may be planted in some other part of the garden. Before planting out, clip all the leaves off except the top bud. The plants so treated will start to grow immediately, because they are not obliged to expend their energy in trying to revive the dying leaves. The plants will bear a month earlier.

When the first fruit forms, stop the plant by pinching off the ends of the shoots.

A very good plan to train tomatoes is to erect a framework of hardwood pegs, 18 in. above the ground, nail hardwood battens on the top, and stretch wire netting across it. The young vines must be properly guided and trained through the meshes, and not be allowed to fall back again. When the vines are full grown, the top of the netting is a complete mass of fruit and leaves, and all the fruit is clean.

Tomatoes may also be trained on stakes. As soon as the planting is completed, a split stake, 5 ft. in length, is firmly set at each plant, and about the time the fruit is setting each plant is tied with common cord. The string is tied firmly round the stake, and loosely about the stem of the plant, so as not to interfere with its growth. Care must also be taken not to allow the fruit to cluster, so as to rub against the stake.

The sprouts or auxiliaries will grow very rapidly, and must be constantly pinched off. Three tyings are usually necessary up to the time when five good clusters of fruit have set. When these aggregate 20 or 25 tomatoes, the top is pinched off, and the whole strength of the plants is centred in the production of firm, bright, smooth tomatoes, of good and uniform size. Pinching back the suckers tends to increase the size of the leaves, making shade for the fruit. Constant systematic pruning forces the plant into fruiting; therefore, carefully remove all suckers.

Tomatoes mature in three or four months, according to the soil, season, and climate.

Manure for Tomatoes: It is a prevalent idea that the tomato will not stand heavy manuring. This is only true of the crop after the fruit has set. In the early stages of development, nitrogen, phosphoric acid, and potash may be liberally supplied with advantage, but, after the fruit has set, manuring with farmyard manure or other stimulating fertilisers delays the development and ripening of the fruit.

A good manure is made up as follows:—

2 parts of nitrate of soda;
2 parts of bonemeal;
3 parts of kainit;
4 parts of superphosphate.

Of this mixture, 1 oz. per square yard of soil may be applied weekly, from the time that the plants are established till the fruit has set. Superphosphate has been found to hasten the maturing of the fruit.

# Dairying.

## THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF MAY, 1914.

| Name of Cow. | Breed. | Date of Calving. | Total Milk. | Test. | Commercial Butter. | Remarks. |
|---|---|---|---|---|---|---|
| | | | Lb. | % | Lb. | |
| Lady Melba | Holstein ... ... | 6 Mar., 1914 | 928 | 3·8 | 39·28 | |
| Miss Lark ... | Ayrshire ... ... | 27 Dec., 1913 | 929 | 3·6 | 37·16 | |
| Gretchen ... | Holstein ... ... | 6 May, 1914 | 721 | 4·2 | 33·96 | |
| Madame Melba | ,, ... ... | 10 Nov., 1913 | 667 | 4·2 | 31·47 | |
| Lady May ... | Ayrshire ... ... | 4 May, 1914 | 695 | 4·0 | 31·06 | |
| St. Elizabeth | Jersey ... .. | 16 April ,, | 431 | 6·1 | 30·75 | |
| Nina ... | Shorthorn... ... | 5 April ,, | 700 | 3·6 | 28·00 | |
| Miss Jean ... | Ayrshire ... ... | 13 Jan. ,, | 463 | 5·2 | 27·95 | |
| Burton's Lily | Shorthorn... ... | 29 Dec., 1913 | 510 | 4·6 | 26·39 | |
| Miss Melba | Holstein ... ... | 22 Jan. ,, | 508 | 4·6 | 26·29 | |
| Daisy ... | ,, ... ... | 14 Feb. ,, | 556 | 4·2 | 26·15 | |
| Queen Kate | Ayrshire ... ... | 4 Jan., 1914 | 583 | 4·0 | 26·05 | |
| Lavinia's Pride | ,, ... ... | 11 Dec., 1913 | 577 | 4·0 | 25·78 | |
| Glen ... | Shorthorn... ... | 27 Oct. ,, | 493 | 4·6 | 25·50 | |
| Silver Nell ... | ,, ... ... | 26 Sept. ,, | 396 | 5·2 | 23·90 | |
| Lady's Maid | ,, ... ... | 17 Mar., 1914 | 592 | 3·6 | 23·68 | |
| Rosine ... | Ayrshire ... ... | 27 Nov., 1913 | 443 | 4·6 | 23·50 | |
| Lady Loch... | ,, ... ... | 31 Aug. ,, | 411 | 5·0 | 23·19 | |
| Miss Bell ... | Jersey ... ... | 25 Sept. ,, | 459 | 4·2 | 21·69 | |
| Bella ... | Ayrshire ... ... | 16 Dec. ,, | 373 | 5·0 | 21·05 | |
| Skylark .. | ,, ... ... | 2 Feb., 1914 | 447 | 4·1 | 20·99 | |

## PROTECTION OF BANANAS FROM FLYING FOXES.

There are two methods of protecting ripening bananas from flying foxes, grasshoppers, &c.—one of which was adopted in this State with much success. That was to enclose the bunches of fruit in stocking-net bags, specially made for the purpose at the cotton-mills of Messrs. Joyce Brothers, at Ipswich. Another plan is said to be adopted in Papua, which is to wrap the bunch in dry banana leaves or grass. We have seen large areas of land under bananas on the southern and south-eastern coast of Papua; but such a practice did not come under our notice. It may be carried out in more inland districts. Mr. H. Tryon, Government Entomologist, in a report on the subject of protection of bananas, says that in Honolulu the growers not only wrap up the bunches of green bananas, but despatch them to California when so covered; a fact that accounts for the excellent condition in which they are generally received.

# Poultry.

## REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, MAY, 1914.

One thousand eight hundred and forty eggs were laid during the month. The slight attack of chicken-pox reported last month has since affected nearly all the pens. Although the attack has been very mild, it has been the cause of putting almost all the birds, except those in three leading pens, off their food, with the result that they have gone off in laying and many have gone into moult. The following pens have been most affected:—J. Zahl, Range Poultry Farm, and A. H. Padman. Three of these pens have five birds in moult. Laying improved towards the end of the month, and better results are anticipated for June. T. Fanning wins the monthly prize.

The following are the individual records:—

| Competitors. | Breed. | May. | Total. |
|---|---|---|---|
| A. T. Coomber, Bundaberg ... ... | White Leghorns ... | 107 | 217 |
| T. Fanning, Ashgrove, Brisbane ... | Do. ... ... | 114 | 212 |
| Kelvin Grove Poultry Farm, Brisbane ... | Do. ... ... | 108 | 192 |
| Loloma Poultry Farm, Rockdale, N.S.W. | Do. ... ... | 93 | 146 |
| Mrs. Bieber, Childers ... ... ... | Brown Leghorns ... | 57 | 132 |
| George E. Austin, Boonah ... ... | White Leghorns ... | 53 | 130 |
| Loloma Poultry Farm, Rockdale, N.S.W. | R. I. Reds ... ... | 87 | 127 |
| J. Gosley, Childers ... ... | White Leghorns ... | 52 | 112 |
| Cowan Bros., Burwood, N.S.W. ... | Do. ... ... | 74 | 118 |
| R. Jobling, Wallsend, N.S.W. ... ... | Do. ... ... | 42 | 109 |
| Moritz Bros., Kalangadoo, S.A. ... ... | Do. ... ... | 50 | 108 |
| J. R. Wilson, Eudlo ... ... ... | Do. ... ... | 47 | 102 |
| J. Kilroe, care of Finney, Isles, Brisbane | Do. (No. 2) | 30 | 102 |
| J. F. Coates, Rockhampton .. ... | Black Orpingtons ... | 67 | 90 |
| A. F. Camkin, Kogarah, N.S.W. . | White Leghorns ... | 67 | 88 |
| J. M. Manson, Brisbane ... ... ... | Do. (No. 1) | 67 | 86 |
| J. Kilroe, care of Finney, Isles, Brisbane | Do. (No 1) | 31 | 85 |
| J. D. Nicholson, Arncliffe, N.S.W. ... | Do. ... ... | 53 | 82 |
| Mrs. Munro, Sunnyside, Warwick .. | Do. ... ... | 21 | 78 |
| Range Poultry Farm, Toowoomba ... | Do. ... ... | 19 | 77 |
| Mrs. W. D. Bradburne, Kogarah, N.S.W. | Do. ... ... | 32 | 72 |
| A. H. Padman, Adelaide, S.A. ... ... | Do. ... ... | 27 | 71 |
| C. M. Jones, Rockhampton ... ... | Do. ... ... | 39 | 68 |
| George Tomlinson, Boonah ... ... | Do. ... ... | 48 | 67 |
| Marville Poultry Farm, Moorabbin, Victoria | Do. ... ... | 39 | 66 |
| J. N. Waugh, Bankstown, N.S.W. ... | Do. ... ... | 49 | 66 |
| J. T. Coates, North Rockhampton ... | Do. ... ... | 21 | 66 |
| R. Burns, Sladevale, Warwick ... ... | Black Orpingtons (No. 1) | 47 | 64 |
| J. Zahl, Boonah ... ... ... ... | White Leghorns ... | 16 | 62 |
| F. McCauley, Clifton ... ... ... | Do. ... ... | 18 | 54 |
| E. Le Breton, Milton ... ... ... | Do. ... ... | 32 | 53 |
| J. M. Manson, Brisbane ... ... ... | Do. (No. 2) | 42 | 51 |
| Derrylin Poultry Farm, Mutdapilly ... | Do. ... ... | 22 | 51 |
| J. Franklin, Coolabunia ... ... ... | Do. ... ... | 31 | 49 |
| J. Murchie, Childers ... ... ... | Brown Leghorns ... | 16 | 47 |
| R. Burns, Sladevale, Warwick ... ... | Black Orpingtons (No. 2) | 27 | 44 |
| E. V. Bennett, Kalangadoo, S.A. ... | White Leghorns ... | 25 | 44 |
| R. Burns, Sladevale, Warwick ... ... | S. L. Wyandottes ... | 38 | 42 |
| Douglas Moreton, Coraki, N.S.W. ... | White Leghorns ... | 24 | 39 |
| T. Fanning, Ashgrove, Brisbane ... | Black Orpingtons ... | 8 | 8 |
| Total ... ... ... ... | ... | 1,840 | 3,477 |

# State Farms.

## NOTES FROM KAMERUNGA STATE NURSERY—MAY, 1914.

BY THE MANAGER.

The rainfall for month of May totalled 3·80 in., number of days on which rain fell being 17; maximum solar reading, 152 degrees Fahr.; minimum terrestrial reading, 54 degrees Fahr. I give these readings, as it is under these conditions that plants grow and not under maximum and minimum in shade.

With regard to crops grown for seed, the small plots of cowpeas, soya, sesame, and white panicum have now been harvested, but, owing to the long drawn-out wet season, a large proportion of the seed was spoilt in the field. Coffee: Small pickings are now coming in, some being prepared for seed and dried in ashes, the balance being kept as clean parchment. As was expected, after the dry months experienced during the latter half of last year, when the trees flowered and seed was setting, the beans are small.

Cardamoms are also very small, for the same reason.

Gros Michel bananas, although growing in poor soil, have yielded some fine quality fruit, though I have no doubt the bunches would be considerably larger on good soil. As it is, it is only those which have been manured that give anything like decent bunches with fruit of good quality. One of Mr. Brünnich's formulas was the one used, viz.:—

$$\left.\begin{array}{l}1 \text{ lb. sulphate of potash} \\ 1\tfrac{1}{2} \text{ lb. superphosphate} \\ 1\tfrac{1}{10} \text{ dried blood}\end{array}\right\} \text{per stool.}$$

I prefer nitrogen in the form of dried blood in this wet climate, as it appears to hold better in the soil, but, if I had had any nitrate of soda in stock during the dry months of last year, a top dressing would have undoubtedly been very beneficial.

The wet season now being over, cultivation between bananas should be done where possible and weeds, &c., buried to provide humus. Where implements cannot be used, the surface of ground should be broken with hoe or fork hoe, so as to leave a soil mulch and enable the soil to get aerated and warmed after all the wet.

## BUNGEWORGORAI—ROMA.

Manager's report for month ending 13th June, 1914:—

*Meteorological.*—The conditions mentioned as prevailing at time of submitting previous report have undergone a change, seasonable weather now being experienced. The result has been that a complete cessation of summer growth has taken place, excepting in isolated situations on the higher ground. So far no damage has been observed where likely to occur.

The maximum temperature recorded was 83·0; average, 69·6.

The minimum temperature recorded was 31·5; average, 43·3.

*Rainfall.*—·92, representing two wet days.

*Winter Crops (Cereals).*—All the experiment blocks have been sown, and are above ground, an A1 germination having taken place. The following sowings have been made, viz.:—

Thirteen quarter acres manurial experiments; 44 eighth acres, 29 new crossbreds, 15 named varieties; 5 sixteenths acres, 4 new crossbreds, 1 named variety; 77 5-chain drills, 44 new crossbreds, 18 named varieties of wheats, 15 varieties of oats; 4 blocks, 1·4 acres, variety tests; 2 blocks, ·57 acres, variety tests; 1 block, 11½ acres, variety tests; 2 blocks, 2½ acres, variety tests; 1 block, 5½ acres, variety tests; 631, ½-chain drills of crossbreds in the F1 to F6 generations.

In addition to the foregoing, 24 acres have been sown as a chance crop, a green manurial crop having just been ploughed in; consequently there is a complete absence of reserve moisture, and the crop will have to depend wholly upon precipitation experienced during the growing period.

*Orchard (Deciduous).*—The trees in most instances are becoming denuded of foliage. The plums mentioned in last report as having proved unremunerative have been removed.

*Citrus.*—With the exception of the "Valencia Late" and "Mediterranean Sweet" oranges, the crop in this branch has been removed, and the better quality of the fruit marketed, satisfactory prices being realised.

*Cowpeas.*—Prior to frosts being experienced, specimen plants were secured for exhibition purposes; some of the new crossbreds demonstrating in a marked degree the possibilities of this class of crop for green manuring or fodder purposes on the light soils of this district.

*Teff Grass.*—The harvesting of the larger area sown with this crop was accomplished during the period under review. From the area, one-fifth of an acre approximately, one large wagon load of hay was obtained, which yielded on being threshed 235 lb. of seed, equal to about half a ton per acre. Under the prevailing conditions of this season, this grass has done well, and, though it is rather too early to advocate the extensive sowing of it, its behaviour warrants it being recommended to farmers for the purpose of making trial sowings in different districts. This would greatly facilitate the determining of its suitability or otherwise for growing in this State.

From the sowings made here, it has proved itself exceedingly hardy under adverse conditions, and responds with marvellous rapidity when congenial ones ensue. It is rather weak in the straw, and, if permitted to stand long after the heads have fully developed, is inclined to go down or lodge upon rain being experienced, making harvesting extremely difficult, and, if the crop is thick, well nigh impossible with machinery. For this reason, on our soils at least, it will be necessary to harvest at the stage aforementioned. If cut at this time, sufficient second growth will be forthcoming to furnish seed for the following season's requirements. As a grazing crop no endeavour has been made here to ascertain its value. Seed available at 2s. 6d. per lb.

*General.*—Applications for seed wheat still come to hand. A heavy demand exists for vine cuttings, and a slight difficulty may be experienced in meeting the clients' requirements.

Live stock of all descriptions look exceptionally well.

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## WARREN.

The acting manager reports for the month of May:—

Weather conditions during the month have been exceptionally trying, not a point of rain having fallen. This, following up the dry month of April, has made conditions rather critical round this district, signs of drought being very evident. In spite of this, however, the farm is looking exceptionally well, and all the crops, although in need of rain, are progressing in a satisfactory manner.

*Cereals.*—The cereal crops are growing well, and in spite of the dry weather conditions are presenting a lovely green appearance. The three selected varieties are stooling out well and will make excellent hay. The block sown with Californian Feed Barley is literally "crying out" for more rain, and the crop is presenting a yellowish colour.

*Lucerne.*—This is growing well and has been again cultivated. Part of the lucerne paddock is to be subsoiled per means of explosives.

*Maize.*—The maize crop has been completely harvested, and only fair yields resulted. The Boone County White variety has proved itself superior in every way to the other two varieties. This only emphasises the utility of the white variety in a dry district like ours. The prejudice against the white maize will have to be lived down.* Twelve acres of the maize land have been put under the plough, and are being prepared for the reception of cereals when the rain comes.

The orchard has been again cultivated and the ground round the trees has been dug up.

Mandarins and lemons have been marketed, and old fruit carted away.

*Potatoes.*—This crop has been constantly cultivated. The tubers have set well, and have grown splendidly. Towards the end of the month three severe frosts were experienced, and, as a result, the potato plants suffered. The crop now presents a blackened appearance, but the tubers are in no way affected.

Clearing operations are being carried out with the aid of explosives, and a number of trees have been removed.

Half an acre of Rhodes grass has been cut. This was allowed to dry and then made into bales for the Panama Exposition.

*The Dairy.*—Dairying operations throughout the month have occupied much time and labour. Although droughty conditions and westerly winds prevailed, the herd, as a whole, milked very well, giving

* White maize was grown by several farmers fifty years ago on the Brisbane River and Oxley Creek, but it was not appreciated by buyers, and its cultivation was abandoned.—Ed. "Q.A.J."

good butter fat tests. This is largely due to the fact that we rug our cows during the cold weather. Few farmers round this district recognise the value of rugging their herds, and it is seldom done. They do not realise that the unrugged cows, on cold nights when the theremometer is registering below freezing point, require something to keep them warm. If this warmth is not created artificially by man, then nature provides it, the cow utilising the natural fats in its body which create heat. The large percentage of these fats is extracted from the milk, and this is the chief reason for low tests in winter time. The extra cost of rugging cows is well repaid in higher butter fat tests.

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# Statistics.

## RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MAY, 1913 AND 1914, FOR COMPARISON.

| Divisions and Stations. | Average Rainfall. May. | Average Rainfall. No. of Years' Records. | Total Rainfall. May, 1914. | Total Rainfall. May, 1913. |
|---|---|---|---|---|
| *North Coast.* | In. | | In. | In. |
| Atherton ... ... | 2·11 | 13 | 2·40 | 3·37 |
| Cairns ... ... | 4·57 | 27 | 6·17 | 7·52 |
| Cardwell ... ... | 3·69 | 27 | 6·20 | 8·96 |
| Cooktown ... ... | 2·92 | 27 | 6·27 | 5·72 |
| Herberton ... ... | 1·60 | 27 | 1·59 | 3·63 |
| Ingham ... ... | 3·47 | 22 | 7·69 | 5·33 |
| Innisfail ... ... | 13·25 | 27 | 15·76 | 12·84 |
| Mossman ... ... | 2·10 | 5 | 5·41 | 4·27 |
| Townsville ... ... | 1·46 | 30 | 0·60 | 2·26 |
| *Central Coast.* | | | | |
| Ayr ... ... ... | 1·22 | 27 | 0·39 | 2·02 |
| Bowen ... ... | 1·43 | 27 | 0·47 | 1·71 |
| Charters Towers ... | 0·91 | 27 | 0·20 | 1·46 |
| Mackay ... ... | 4·19 | 27 | 3·08 | 4·65 |
| Proserpine ... ... | 6·11 | 11 | 4·06 | 6·54 |
| St. Lawrence ... | 1·97 | 27 | 0·28 | 2·43 |
| *South Coast.* | | | | |
| Crohamhurst ... | 4·91 | 20 | 6·32 | 8·13 |
| Biggenden ... ... | 2·09 | 14 | 0·95 | 4·06 |
| Bundaberg ... ... | 2·93 | 27 | 0·96 | 5·31 |
| Brisbane ... ... | 2·98 | 63 | 3·63 | 6·32 |
| Childers ... ... | 2·59 | 19 | 1·14 | 5·89 |
| Esk ... ... ... | 2·29 | 27 | 2·71 | 4·05 |
| Gayndah ... ... | 1·74 | 27 | 0·67 | 3·49 |
| Gympie ... ... | 2·83 | 27 | 1·96 | 4·09 |
| Glasshouse M'tains | 2·82 | 6 | 5·27 | .. |
| Kilkivan ... ... | 2·25 | 27 | 0·40 | 6·41 |
| Maryborough ... | 3·08 | 27 | 1·82 | 7·21 |

| Divisions and Stations. | Average Rainfall. May. | Average Rainfall. No. of Years' Records. | Total Rainfall. May, 1914. | Total Rainfall. May, 1913. |
|---|---|---|---|---|
| *South Coast—continued:* | In. | | In. | In. |
| Nanango ... ... | 1·70 | 27 | 1·39 | 3·76 |
| Rockhampton ... | 1·70 | 27 | Nil | 3·45 |
| Woodford ... ... | 3·02 | 27 | 3·68 | 6·86 |
| Yandina ... ... | 4·85 | 21 | 7·91 | 7·19 |
| *Darling Downs.* | | | | |
| Dalby ... ... | 1·48 | 27 | 1·09 | 2·47 |
| Emu Vale ... ... | 1·12 | 17 | 2·98 | 2·05 |
| Jimbour ... ... | 1·41 | 24 | 1·08 | 2·22 |
| Miles ... ... | 1·79 | 27 | 1·02 | 2·61 |
| Stanthorpe ... | 1·75 | 27 | 3·81 | 3·31 |
| Toowoomba ... | 2·27 | 27 | 3·82 | 5·92 |
| Warwick ... ... | 1·61 | 27 | 3·93 | 4·16 |
| *Maranoa.* | | | | |
| Roma .. ... | 1·51 | 25 | 1·18 | 3·19 |
| *State Farms, &c.* | | | | |
| Gatton College ... | 1·96 | 14 | 2·25 | 8·49 |
| Gindie .. ... | 1·11 | 13 | 0·01 | 3·69 |
| Kamerunga Nurs'y | 4·37 | 23 | 3·80 | 8·48 |
| Kairi ... ... | ... | ... | 1·87 | 2·18 |
| Sugar Experiment Station, Mackay | 3·81 | 16 | 3·89 | 4·36 |
| Bungeworgorai ... | ... | ... | 1·43 | 3·69 |
| Warren ... ... | ... | ... | Nil | 2·76 |
| Hermitage ... | 0·91 | 7 | 3·49 | 2·96 |

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for May this year and for the same period of 1913, having been compiled from telegraphic reports, are subject to revision.

# The Orchard.

## A JAPANESE FORMULA FOR DESTROYING THE WOOLLY APHIS.

"The Fruit World" (May) publishes the following remedy for Woolly Aphis:—

"Mr. T. Machida, of Japan, has recently found a very satisfactory wash formula, which has been found to be of much value in the control of the Woolly Apple Aphis. His recommendations for the various ingredients to be used are as follows:—

| | |
|---|---|
| Rape-seed oil .. .. .. .. .. | $3\frac{1}{3}$ pints. |
| Sulphur .. .. .. .. .. .. | $1\frac{1}{2}$ oz. |
| Turpentine .. .. .. .. .. | $7\frac{1}{3}$ oz. |

The rape-seed oil should be boiled alone for a very short time, followed by adding the turpentine slowly, stirring continually until they are thoroughly mixed. Stir in the required amount of well crushed sulphur. Use a strong fire and allow to cool, when the mixture assumes a darkish colour. Paint the attacked parts of fruit trees. This wash can also be recommended for use in the control of other aphides and the destruction of their eggs.—S. Nakayama, Stanford University."

The above was submitted to Mr. C. Ross, F.R.H.S., Instructor in Fruit Culture, and he thinks that the remedy would be well worth a trial.

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## DRYING BANANAS.

The manufacture of what are known as "Banana Figs" is an important industry in the West Indies, Mexico, and to some extent in other banana-producing countries. The simplicity of the process (particularly in a climate like Southern and Central Queensland), the abundance and cheapness of the fruit, and the excellent flavour and keeping qualities of the dried fruits should afford strong inducement to establish a trade in banana figs, which, in Jamaica, has assumed considerable importance. Eleven factories on that island are exclusively occupied with the manufacture of banana figs. These can be sold in Hamburg at the rate of 300 56-lb. boxes monthly at about 42s. to 43s. per cwt. ex store, Hamburg. In the English market the dried fruit sells at from 35s. to 38s. per cwt. In 1913, there were exported from Jamaica 9,389 packages of banana figs, valued at £7,808.

The object of drying any material is to prevent deterioration by fungus growth, which can only do its destructive work in the presence of moisture. The simplest and most natural form of drying fruits is to expose them to the sun and air; but in some countries the uncertainty of the weather has led to various methods of artificial drying.

We are, however, here only concerned with sun-drying, to which, as stated, the climate of Queensland particularly lends itself. In parts of

Mexico, where the climate is very dry, the ripe fruits are exposed to the sun till the skin begins to wrinkle. They are then peeled, and again exposed until an efflorescence of sugar appears on the surface, as in dried figs. They are then pressed in masses of 25 lb. each. This process is only practicable in dry climates. The fruits usually are allowed to thoroughly ripen. Then the skin is removed, after which they are cut lengthwise into four slices. These are then laid on a trellis-like stand, usually of bamboo, in the sun. The fruit soon becomes covered with a white sugary powder deposited from its own juices. When this occurs, they are ready to be packed in boxes, where they will keep for years. Such banana figs have been known to keep good for sixteen years. The boxes (cardboard) contain about 15 to 20 of the fruit.

Another good method is to boil the fruit rapidly in water to which sulphate of lime has been added. After boiling, the fruit is exposed to the sun on bamboo trays or on anything which is clean and permits the free action of air and light. As an easy branch of domestic industry, the drying of the banana affords promise of important results to the prosperity of our coast farmers.

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## THE CULTIVATION AND USES OF THE ROSELLA.

By DANIEL JONES.

At the request of some of our readers who have only lately taken up farming pursuits, we republish the following article on the Rosella, which appeared in the Journal in May, 1900:—

The Rosella (*Hibiscus Sabdariffa*) is one of our most valuable fruits, and, from the standpoint of the thrifty housekeeper, few edibles in the range of domestic cookery lend themselves more usefully to the stocking of a housewife's cupboard. In dealing with this fruit, the writer will, as briefly as possible, refer to the cultivation of the plant as well as indicate a few methods of preparing the fruit for domestic needs.

### SEED.

The most important matter to attend to, in the first instance, is to procure sound, fertile seed. Seed grown in the Northern part of the State is usually safer to use than that grown in our Southern districts, it being on the whole better developed and more likely to be fertile. The Northern growers having a longer maturing season, owing to the absence of frost, a fuller germination and hence a better quality of seed is produced by them. Nevertheless, in certain seasons in our Moreton districts, it is possible to save seed fully equal to that grown in more tropical parts; yet it is by no means certain that the season may prove propitious, and the local seed may turn out barren, although, to the inexperienced eye, it may appear otherwise.

### SOIL.

Any moderately good soil will grow rosellas well. Land with a clay subsoil, if the latter be near the surface, had better be avoided if cultivating on a large scale; but for an allotment garden, where only a few

trees are grown, the plant, with an average amount of attention, can be cultivated well enough to give returns sufficient to fill the cupboard for family needs, though perhaps not on so lavish a scale as if grown under more favourable conditions.

The shrub being hardy and, as a rule, fairly ornamental, given fair treatment, is calculated to adorn and prove useful in the kitchen garden no less than in the field.

## SOWING.

My practice was to fix upon small patches of clean soil for a seed bed contiguous to the area proposed to be set out. For instance, when planting several acres, I found, by my method of setting, I could treat a much larger area with less labour, and do it more efficiently, by drawing from the nearest seed beds as the transplanting proceeded. For the ordinary kitchen garden it will suffice to mark out a plot a few feet square and lightly cover the seeds, well watering them and keeping the plot free of weeds until the plants are about 6 in. high, and then set them out in rows about 6 ft. apart. If the grower is not disposed to start his seed from beds, the latter can be sown where the bushes are to remain, and thus the trouble of transplanting is saved; but precaution must be taken to have a few spare plants to meet the contingency of having some destroyed by grubs or other causes, so that the vacant spaces can be filled up. The best time to establish seed beds is during the month of October. Early sowing is recommended in the Southern parts of the State, as, in the event of early frosts coming on, the maturing of the fruit will be seriously affected.

I have observed that late plantings in November generally prove fruitful, but, owing to the shortened period for attaining maturity, the plants will only be imperfectly grown, and produce but a proportionately limited crop. Hence, to obtain the most satisfactory results, early propagation of the plant is imperative. Of course, in our Northern regions and in part of our Southern coastal districts, which are comparatively immune from early frosts, the planting season can be safely put off until November or the early part of December without undue risk to the crop.

## TRANSPLANTING.

In the ordinary course of garden work, the transplanting is usually performed by the simple removal of the plants from the seed bed, without unduly tearing the tender root. A small hand fork for loosening the soil, so that the plant can be lifted in good order, is all that is needful. The plants having been raised, set the plants out in regular rows, and in well-firmed fertile soil, giving due heed to the equal extension of the root fibres, which not only helps to hold the plant firm as against strong winds which often seriously affect the shrub when in vigorous growth, as it acquires a head considerably out of proportion to its foothold, but it also enables the roots by the regular radiation to find more plant food for the sustenance and early development of the bush—all of which, though apparently trivial precautions, nevertheless have a very important bearing on the cultivation of this fruit. Perhaps my own practice in

handling this crop as a feature of field and orchard operations may now be brought in. During my early orchard efforts, while my young trees were being planted out, it became necessary to discover what catch crop could be cultivated with advantage between the rows of orchard trees. My choice, for some seasons, fell on the rosella as being a crop which would not unduly interfere either with the cultivation of my fruit trees or exhaust the soil to any serious extent. The first lesson in orchard operations, more especially with young trees, is to have and keep your land clean from weeds at the least possible cost, which at once suggests the employment of labour-saving machinery. I determined to try a system of my own devising, which proved very successful.

As my planting operations necessarily spread over several acres of orchard, and at most two rows of plants could be set in between each row of fruit trees, in order to facilitate transplanting over this area, I, as before stated, selected suitable spaces contiguous to my proposed planting areas for seed beds, sowing the seed not so thickly as ordinary for reasons hereafter given. These beds were well watered and kept clean, so that in the transfer of plants no weeds would be conveyed to the orchard land. Most persons acquainted with the routine of orchard work will appreciate the necessity for keeping the land clean to the very last possible moment by the aid of horse implements. Immediately after running the harrows or scarifier over the land and as soon as the soil was in a satisfactory condition, I pegged out my line of drills between the rows of fruit trees, and with an American post-hole digger, with one drive of the implement, raised the necessary amount of soil to enable the transplanted plant to occupy the space, and thus rapidly traversed my length of drill. My next operation was to pick up the plant and soil with the digger from the nearest seed bed, and transfer plant and soil into the hole prepared for it.

The opening and closing mechanism of the digger lends itself most perfectly to this work, and a pressure of the foot on each side of the plant is all that is needed to permanently fix it in its place. Thus the plant is set with the soil at its root undisturbed, and it continues to grow without check.—This system I have successfully adopted in transplanting melons and other plants of a delicate nature that usually do not thrive under harsher treatment. For filling up misses in the rows I have found with many crops this instrument quite as valuable as in its legitimate use as a post-hole digger. But an implement that will satisfactorily perform in some soils may prove a comparative failure in others, hence I do not claim that in all soils success will necessarily follow. I am quite aware that the waxy black soils or heavy clays are not best adapted for my system, but on such soils as I then worked—red loam of a sandy nature—or any of our light scrub soils I know of no better system to adopt. The propagation of this plant by cuttings is not commonly adopted, and indeed is not as satisfactory as from seedling plants; still there are times when the system will prove worthy of a trial. It may be that from failure of the seed to germinate there are not enough plants to fill the area or to supply misses in the rows transplanted. As

it is, however, imperative to replace them, propagation from cuttings, or, more properly, branches, will be expedient. When the shrubs are 1 ft. or 18 in. high, select from your most vigorous and bushy shrub a couple of the lower branches. Do not cut them, but, with a gentle snatch, break off the wood close to the main stem of the shrub. It will break off very easily, and on examination of the branch you will observe the edging of the break will indicate a strong rim of bark which will, on transplanting, quickly become callous and soon provide a good root-hold for the shrub. Bushes propagated in this way in some seasons bear when the more vigorous and earlier shrubs carry little or no fruit, but they are invariably more stunted in growth, yet usually yield a fair crop. Thus, by adopting any of the systems here described, the prospective grower can hardly fail. With a moderate rainfall, rosellas will grow luxuriantly in any locality where the soil is suitable, and when winter frosts do not set in too early to allow of the proper maturing of fruit. Too exposed situations should, if possible, be avoided, as high winds, blowing on the bush with its luxuriant foliage, often break down the branches, and, in times of continued wet weather, blow the shrubs over.

## PICKING THE FRUIT.

This is a rather monotonous occupation for adults, and is more suitable for the young folks. As soon as the fruit is matured, it is advisable to lose no time in gathering. When this work is delayed, I have observed a tendency on the part of the fruit stalk to so toughen as to be an impediment to quick gathering, and, moreover, it leaves the fruit exposed after maturity on the shrubs to become to some extent deteriorated by the attacks of aphis, which often affect it at this stage. In picking for market, care should be observed to pick the fruit as free as possible from stalks, leaves, &c., as, when required by jam factories, the presence of such superfluous matter will militate against its sale.

## SHELLING.

The removal of the edible covering from the seed pod is a somewhat wearisome business, more especially when it depends on hand labour. Usually, the pod is taken in the hand and the covering is dragged off piecemeal, and a knife is employed to sever the base of the pod, which facilitates the removal of the covering, both of which operations are rather slow. Here comes in the truth of the old adage that "necessity is the mother of invention," and, as a result, an invention is to be obtained from some of our city seedsmen that overcomes the difficulty of separating the pods from the fruit, and, the cost of the instrument being moderate, any grower on a large scale who requires to separate the fruit will do well to purchase one. The diagram shows two forms of the instrument. Fig. 1 was invented and patented by Mr. T. Chalk, of Coorparoo; and

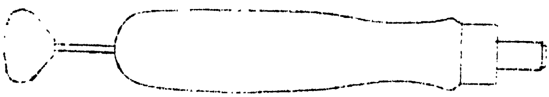


FIG. 1.

Fig. 2 is an improvement on it, which I made for my own use. The difference in the two instruments is that the piston in mine is movable

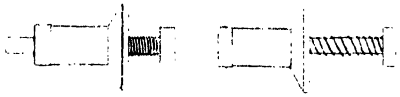


FIG. 2.

and is supplied with a spring, and that, being so short, it can be worked with one hand whilst the fruit is held in the other. Those who care to construct the apparatus for themselves can easily do so with little trouble or cost. My appliance was home-made, and, although crude in appearance, answered its purpose very well. To describe the article, simple though it be, is not very easy; but the outlines being given, the ingenious grower will perhaps be able to, by help of the illustration here given, seize upon the design. It can be made by taking a common cotton-reel and whittling down one end to receive a ferrule, for which I used a small brass cartridge-case. This fits on the end of the reel and acts as a cutter, which is worked by taking the pod in one hand and pressing the ferrule into the stalk-end of the pod and giving it at the same time a slight turn, which causes the cutter to pass clean through the covering, and so relieves the pod. To expel the latter from its covering, you make a small pusher from a piece of round wood that will just work through the hole in the centre of the reel. This piece of wood is made with a flat head, so that it rests against the palm of the hand without hurting it when pressing the pod out, while between the top of the pusher and the reel-head is put a small spiral spring made out of any light wire. This is put on to draw back the pusher after it has driven out the pod, and thus you can quickly and easily prepare this fruit for use.

## UTILISING THE FRUIT.

Most housewives are familiar with the various uses of the rosella. For jam-making it is well adapted, making a palatable, easily-kept product, if put up in earthenware or glass. Unfortunately, rosellas contain an acid principle which precludes putting up this class of fruit in ordinary tinware, and hence some failures have been experienced in this respect. For pickles the fruit is well adapted, and it makes an excellent condiment. In my own experience, I have found that the best method of handling the fruit was to dry it after removing the pod from the capsule, which, if done with the instrument beforo described, cuts out the covering nearly whole, which is thus better adapted for drying purposes. I have kept the dried fruit in jars and tins for two or three years in good order. Rosella-growers would do well to give this mode of peparing the fruit more attention, for I have found it far and away the best in saving the crop. All that is necessary to do in drying is to prepare the fruit as I have shown, and, in some roomy, airy position (not necessarily in the sun), place the fruit either on trays or sheets on the floor, allowing as much air to pass through and over the fruit as possible. In a few days all superfluous moisture will have evaporated, and the dried article can be packed away in jars. By this means rosellas can be had in good condition all the year round. All that is needful, when required for use for jam, tarts, &c., is to take the quantity necessary

and pour over the fruit a little water, when it will absorb the water and resolve itself into apparently fresh fruit. The large grower has in this method a certain way of keeping such surplus fruit that may not be in immediate demand, or that the low prices ruling may deter him from marketing as ordinary fruit. I am of opinion that fruit put up in this form, and exported to the London market, should give better results than the already proved failures in the form of jams.

It is not commonly known that in the utilisation of the choko, now fast becoming a popular vegetable, that very pleasant tarts can be made by using that vegetable (*Sechium edule*) in conjunction with the rosella. It is well known that many object to what they term the excessive tartness of the rosella. Using it in conjunction with the choko this tartness is modified, and tends to make both these fruits more appetising. In fact, rosellas are specially adapted for blending with less tart fruit, as they give a flavour to many fruits and vegetables which otherwise would not be so acceptable for table use.

## WINE-MAKING.

This is a further use for rosellas. Although I have no personal experience in this method of dealing with the fruit, I know that a good palatable beverage is made from rosellas. To those who care to try to utilise this fruit in this manner, I give here a recipe sent me by a friend who has a wide reputation as a maker of rosella wine:—

### ROSELLA WINE.

Put your fruit into a cask that has one head out. Pour boiling water over the fruit, rather more than enough to cover it. Let this stand for about three days—stir now and again.

At the end of three days, strain the liquor into another cask—*this cask to have both heads in.* Then for every gallon of liquor take 3 lb. of sugar, and make a good thick syrup of same.

Pour this syrup while hot into the liquor, and stir well.

Leave the cask with the bung out until fermentation starts. Should this not occur, say, in twenty-four hours, add a bottle of yeast. Keep this cask in as even a temperature as possible, as this will help the fermentation.

In the process of fermentation, you will lose some of your liquor. Should it ferment thoroughly, save the liquor that overflows from the bung-hole, and put it back into the cask; but should you find this not enough to keep your cask full, add a little warm water.

When the liquor has almost finished fermenting—say when it stands at 3 degrees density by the saccharometer (Beaumè)—bung up the cask and leave for three months. Then bottle.

## ROSELLA FIBRE.

From *Hibiscus Sabariffa* fibre has been repeatedly made, specimens of which and of cloth manufactured from it are to be seen in the museum of the Agricultural Department, William street. Some few years ago, a local grower gave the matter of the production of this plant considerable attention, specially in view of the utilisation of his crop for fibre

purposes. I am of opinion that his failure to go on with the matter was consequent on want of machinery to prepare the fibre, which is a drawback only too patent with regard to the development of many industries of this character in Queensland.

### DISEASES.

The diseases affecting this plant are not usually very formidable, although in certain seasons a grub attacks the roots of the bushes, and a disease, apparently fungoid in character, sometimes affects the shrub. The common aphis is usually present in quantity on matured fruit; but, on the whole, while this crop is, in common with others, susceptible to occasional serious injury from pests, it is hardy, useful for many purposes, and profitable to grow.

## BANANAS AT BIGGENDEN.

That the soil of Biggenden can produce bananas as good as any in the North, or any other banana district in the South, is evidenced by the size of the fruit and bunches produced on their Red Hill Farm, Biggenden, by Messrs. Waldock Brothers. The variety is the Cavendish, and the number of fruits was nineteen dozen and four on one bunch and seventeen dozen on another—all equal to those here illustrated. The

PLATE 23.—BANANAS FROM BIGGENDEN.

volcanic red soil on which the plants are growing must be very rich, as no manure was given to them at any time.

Mr. Ross, Instructor in Fruit Culture, says that there are many localities on the Biggenden Line where bananas on a moderate scale would succeed, but not west of Biggenden.

## A FRUITFUL POMEGRANATE TREE.

Mr. C. F. Dennis, in addition to rice-growing, also raises orchard fruits, amongst which is a pomegranate tree only two-and-a-half years

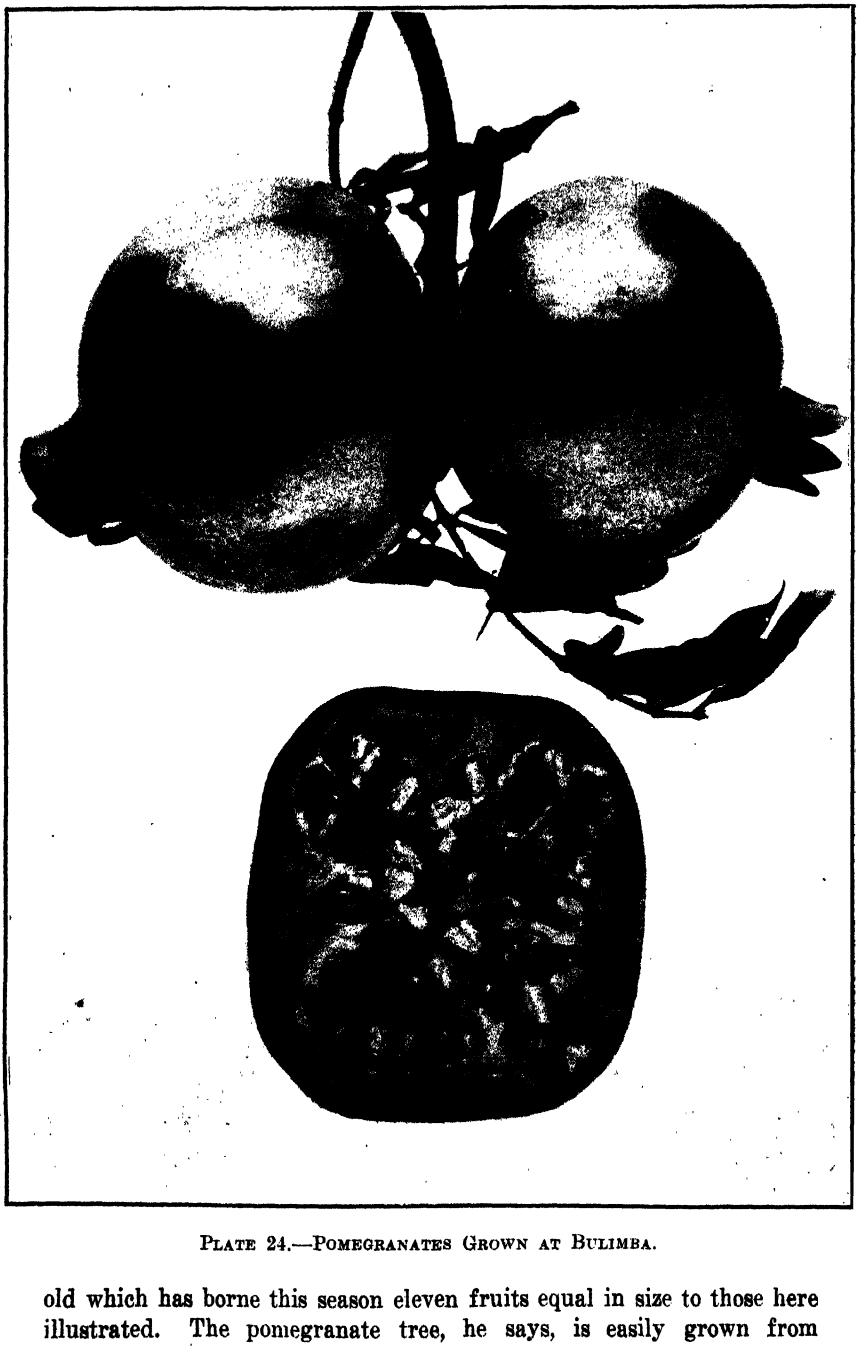


PLATE 24.—POMEGRANATES GROWN AT BULIMBA.

old which has borne this season eleven fruits equal in size to those here illustrated. The pomegranate tree, he says, is easily grown from cuttings.

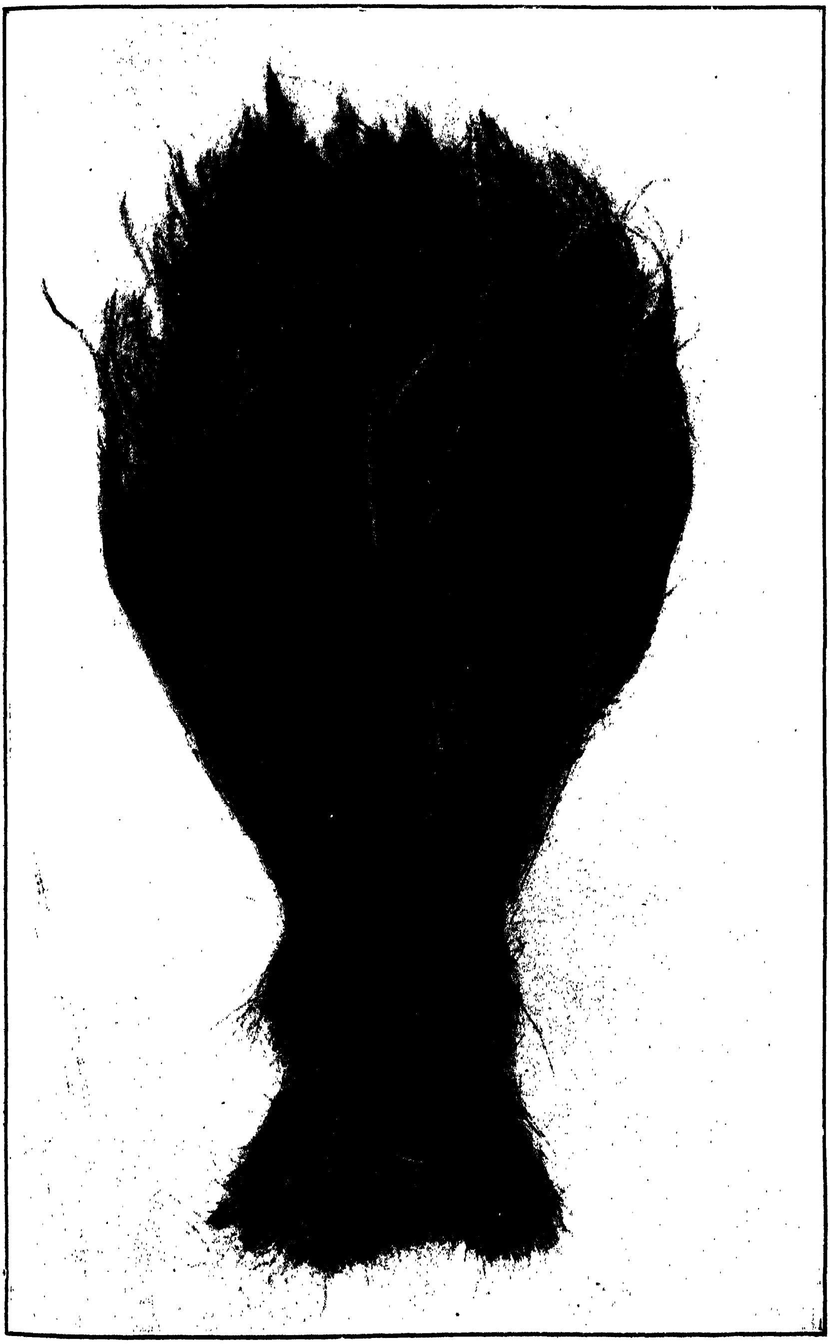


PLATE 25.—TEFF GRASS.
(For Description, *see* April and May numbers of the Journal.)

## CITRUS FRUITS IN THE WESTERN DISTRICTS.

Whilst the Roma district has long ago enjoyed a high reputation for the cultivation of the grape vine and citrus fruits, the lands further to the East have been gradually coming to the front as fruit-producers, owing to the persistent experiments by enthusiastic farmers. In the neighbourhood of Miles, Mr. Jas. Y. Just has a selection, about 7 miles

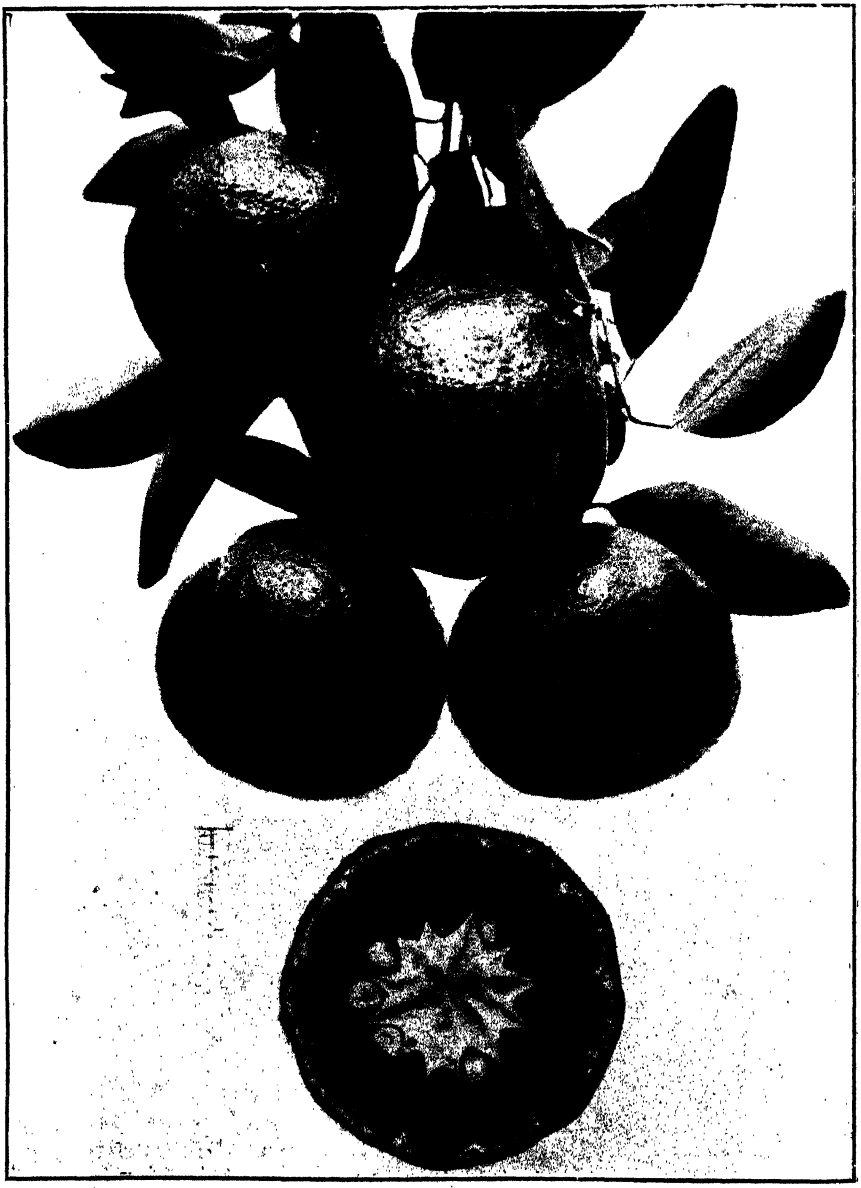


PLATE 26.—BEAUTY OF GLEN RETREAT AND SECTION OF SICILIAN LEMON, GROWN AT "CAMISLA," NEAR MILES.

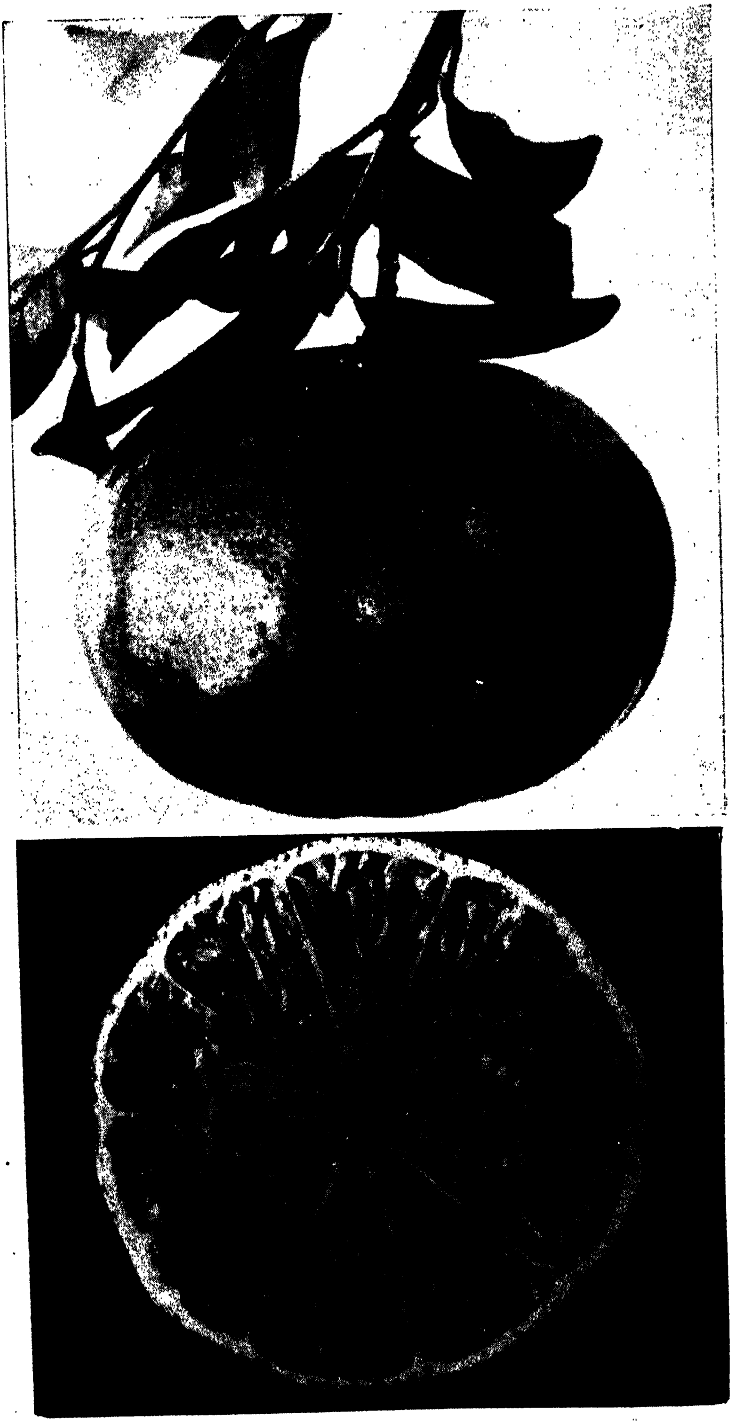
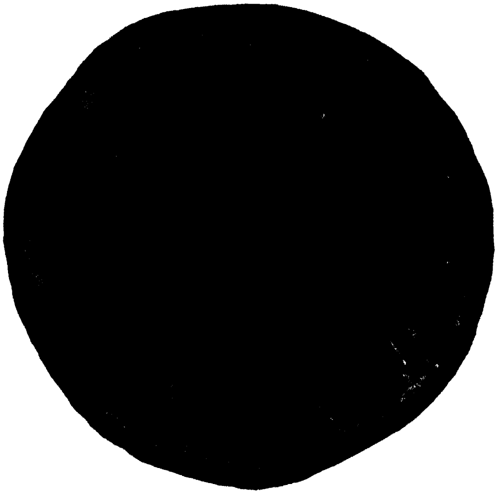


PLATE 27.—BEAUTY OF GLEN RETREAT, ORIGINALLY GROWN AT ENOGGERA

beyond the township, known as "Camisla," on the Western Railway Line. The soil here is ideal for fruit, consisting of a light volcanic loam overlying a subsoil of gravel resting on a loose rock bottom at a depth of from 4 ft. to 6 ft. Here Mr. Just has some very fine Beauty of Glen Retreat mandarins, a sample of which Mr. T. C. Just brought to this office. The trees are now four years old, and are bearing heavily, notwithstanding their having passed through the ordeal of three successive summers of extreme heat and dryness, and during that time not having received any artificial watering. The fruits here illustrated will serve to give an idea of the excellence of the growth, although they are somewhat reduced from the natural size. Lemons also succeed as well on "Camisla" as in the Barcaldine district, which has long been celebrated for the fine lemons grown in the district. The trees at "Camisla" are four years old, and the fruit is large, very bright, and thin-skinned, and may be considered quite equal to the imported Italian



PLTAE 28.—SICILIAN LEMON.

lemon, being of Sicilian origin. When Mr. E. E. Wood, from Texas, U.S.A., was at Miles studying the conditions for cotton-growing in the West, he obtained some very fine bolls of Uplands cotton on Mr. Just's farm, which he stated surpassed in quality any cotton of this class grown in the United States. In the June issue of this Journal, the source whence Mr. Wood obtained these bolls was given as Dulacca; but Mr. Just states that they came from his son's farm near Miles. About 1 ton of good cotton was obtained from the small area planted, and Mr. Wood considered that the soil and climate of the district were eminently suited for successful cotton-growing.

For the purpose of comparison, we reproduce a plate showing the original Beauty of Glen Retreat, as grown by Mr. W. H. Parker in his orchard, "Glen Retreat," at Enoggera, in 1900. The tree was then between 30 and 40 years old, measured 22 ft. in height, with a spread of branches of 24 ft. The fruit was of large size—up to 3½ in. in diameter; the skin very smooth and thin, and shining as though polished with an oily cloth, and semi-transparent.

# Tropical Industries.

## FIBRE FROM THE MUSA OR BANANA FAMILY.

By T. BINNIE.

In these days—when material for the making of paper, cordage, and bags for the holding of all sorts of produce during transport is in great demand—there is no raw material which may be utilised in the manufacture of any of these articles which is beneath the notice of those living in a country which, from its soil and climatic conditions, is suited to the growth and production of such raw material. Any addition, therefore, to the production of a country (which does not rob it of its natural riches) is at once adding to that country's capital.

The most valuable Musa fibre is undoubtedly that yielded by *Musa textilis.* There is a very large number of varieties of this, all differing in habit and in quality of fibre yielded by them; but I question if there is much difference between the Tangngon (*sic.*) variety (which is one of the best grown in Southern Mindanao, Philippine Islands) and the wild banana. For centuries the fibre from the *Musa textilis* was the only material the natives of the Philippine Islands could obtain wherewith to clothe themselves and make ropes, nets, and sails for their canoes and larger boats, so that, from generation to generation, selection was made of rootstocks of plants which yielded a strong, coarse fibre for rope-making, a better fibre for the making of canvas, and a still finer fibre for the making of their wearing apparel, until there have been evolved the varieties known to commerce as Manila hemp, Abacà, or *Musa textilis* grown simply for its fibre. This bears no edible fruit, and is, therefore, distinct from the banana of commerce, from which also a fibre can be obtained, which, while it is not so strong as that obtained from *Musa textilis,* is still of value. This and fibres from other members of the family will be dealt with later on.

*Musa textilis* is one of the most important sources of supply for cordage fibres, and at the present time the Philippine Islands enjoy a practical monopoly, and control the trade, which amounts to over 150,000 tons per annum. It has been considered that it was only in the Philippine Islands that this valuable fibre can be produced. Lately, however, British North Borneo has been steadily producing this article, and the export of fibre thence is increasing.

For its successful cultivation a locality such as the Johnstone and Russell Rivers, where the rainfall is heavy and regular, would be necessary.

This plant thrives best in volcanic soils containing vegetable matter or humus; hence the virgin scrubs of North Queensland would be eminently suitable. As in most of these places there are perennial running streams, it would be easy to pick spots where the water could be

led on to the land and in times of dry weather the crop irrigated as desired.

Almost any lay of land will do for Manila hemp as long as it is not too swampy or too steep. It thrives best on rich flat land, and does not much mind a flood so long as the water does not stand too long on the land or leave it swampy—in fact, one of the best plantations the writer saw in the Philippines was on a delta at the mouth of a small river, which with the least fall of rain in the mountains at the back flooded the whole place, leaving a heavy deposit of silt after each flood; but the ground was naturally drained, and the water came up and went down quickly.

Manila hemp will not stand any long stretch of dry weather. The stems are composed of layers which contain the fibre, and which in times of drought dry up and wither, when the fibre they contain is rendered useless.

Although seed is produced, propagation by this means is slow and uncertain, although useful for producing new blood, and is not generally adopted. Plantations are usually established by suckers, or corms, in a similar manner to banana plantations; the suckers, or corms, planted 8 to 10 ft. apart.

On scrub lands, cultivation by horse implements being impossible, the expense of weeding can be minimised by planting some cover crop of a leguminous plant, which, while it would keep down all weeds, would at the same time enrich the soil by supplying it with nitrogen and incidentally with humus. From my experience in the Philippines and elsewhere, I would recommend the Mungo Bean (*Phaseolus Mungo*) or the Sensitive Plant (*Mimosa pudica*) for this purpose. These are both legumes, and while the former is an annual the latter is perennial; but, of course, as the Musa plants only take about 15 months to mature, they soon cover the ground and by their shade kill any other growth between the rows; it is only for a short time that heavy weeding has to be done, although it will afterwards be necessary from time to time to go through the area and cut such plants as thrive in the shade in all tropical scrubs.

The planting of *Musa textilis* does not differ from that adopted for the fruiting banana. The cost, exclusive of the cost of plant, should be done for under £3 per acre. The best time for planting would, in Queensland, be from January to the end of March.

The cost of planting and keeping the plantation in order until such time as it begins to produce should not be more, in Queensland, than £10 per acre.

Manila hemp suckers take longer to sprout than the ordinary banana, and send out fewer shoots; but in 3 weeks or so from the time the sucker is put in, if the weather is at all favourable, the first shoot will be seen, and will soon be succeeded by one or two more.* It will be at least 12 months before the first shoot is fully matured and ready to throw out its

* W. Fawcett, late Director of Public Gardens and Plantations in Jamaica, in his late excellent work on the banana (Duckworth and Co., London), says that when the plant—*M. textilis*—is mature it consists of a stool of 12 to 30 stalks, of which 2 to 4 only can be harvested at the same time.—Ed. "Q.A.J."

fruit spathe. When this appears is the best time to cut the stem down for fibre. If so desired, however, it can be utilised earlier, but the percentage of fibre obtained is lower. This is to some extent compensated for by the finer quality of the hemp obtained.

At the age of 12 months the main stem will be nearly fully matured,† two or three others will be of considerable size, and some four or five small suckers will be coming on. In a very short time the ground will be pretty well shaded by the leaves of the maturing plants and the suckers. As the old stems are cut down, the young suckers grow up and take their place.

When it has arrived at this stage, a Manila hemp plantation requires scarcely any attention as long as the workers do not open it up too freely by cutting over-many stems or allowing the scrub plants to encroach too much.

As this crop lasts from 15 to 20 years from the one planting (in fact, I have seen plantations in the Philippines which have not been replanted for over 30 years and are still bearing well), its economic value becomes at once apparent.

From 12 to 15‡ months after planting, the parent suckers throw out their flower head, when they are ready for cutting. At this time the three is at its best, and the leaving of the stalk longer will lead to deterioration and consequent loss.

The stems are cut as close to the ground as possible. The reason for this is that by doing so the after suckers will start from under the ground instead of high up on the old butt, and thus the roots of the after stalks will have a firmer hold of the ground, be more robust, not so easily blown over, and the life of the stool will be prolonged. About 1 ft. of the stalk is cut away, as this contains very little fibre, and that of a poor quality. The top from where the leaves spring is then cut off, and each leaf sheath, of which the stem will be found to be composed, is detached from the others. The fibre is found just below the outer surface of each leaf stalk. The core or the sheaths of the later leaf growth, while containing a very fine fibre, is, under the old method of extraction, thrown away, as the fibre is too fine and slender to stand the strain placed upon it by the strippers under this method; but the newer methods and more perfect machinery mentioned below will no doubt save all this, and will result in the extraction of a more valuable fibre. After cutting down, the operator sits down, and, with a wooden or bone knife and with the leaf sheath on his lap, gently passes the knife between the outer covering of fibre and the cellular tissue below. He separates the fibre in strips about 3 in. wide, and, by giving a smart twitch outwards and upwards, brings away a strip or ribbon of the cuticle with the fibre in it from the whole length of the sheath. This is called a "tuxie"; and there are generally three or four tuxies from each leaf sheath, and from 12 to 20 leaf sheaths to each stem.

† Fawcett says the plant attains its highest textile strength in two to three years.—Ed. "Q.A.J."

‡ Two to three years' according to Fawcett.—Ed. "Q.A.J."

As the operator approaches the heart of the stem, it must be left to his experience to decide as tc the value of the fibre contained in the core. These tuxies (or ribbons) are then conveyed to the stripper, who may be in a central position with many others, or more often close to the tuxier, and working under contract at so much per lb. of dried fibre delivered. Generally, one man cutting down and tuxying will keep at least two men stripping; but this is usually arranged for by the men themselves.

The appliances used for the extraction of the fibre have been of the most primitive and (apart from the labour) inexpensive character. The stripper passes the tuxies through the machine, which consists of a blunt knife held firmly by a bamboo spring on to a flat piece of hardwood; he releases the knife by means of a treadle connected with the spring, and places the tuxie between the knife and the board, leaving a short piece of the tuxie towards himself, which he wraps round a short piece of wood and then releasing the treadle, thus causing the knife to be pressed firmly against the tuxie, which he draws sharply towards himself, the pressure thus freeing the pulp from the fibre by a scraping action. The tuxie is then reversed, and the part that remains unstripped is then pulled through the machine in the same manner, which leaves many strands of clean fibre in the operator's hand. The strain, however, on the fibre breaks away about 50 per cent. of it, which, under the old system, was left on the ground to rot. After this operation, the resulting fibre is hung over racks to dry; and, if the weather is at all fine, about 4 or 5 hours will be long enough to complete the drying. The fibre will not deteriorate by being left out in the dew or a little rain—in fact, it bleaches it.

After drying, the fibre is put up in hanks, which are then put into bundles weighing about 137 lb. These are then sold to the merchants. The bales are generally from 3 to 4 cwt. each, and put together at the port of shipment where the hemp is graded by experts.*

Manila hemp is worth from £15 to £25, and even as high as £30 per ton, according to grade in Manila, and the Queensland grower would have the benefit of freight as well as the export tax levied in the Philippines on all such material shipped to foreign countries from there; so that it would be perfectly safe to put the Australian price down at £20 per ton for the material produced by the machine mentioned below, and no doubt the Commonwealth Government would further assist by placing an import duty on such material.

A planting 10 ft. by 10 ft. will give about 480 stools to the acre, from each of which in the second year 2 stalks should be cut and after that 5 stalks or more per stool.

Under the old system the weight of fibre from each 100 lb. of stalk would average about 2 per cent., but with the machines now being tried the percentage should be at least 4. The stalks should average 75 lb., which will give 72,000 lb. of stalk per acre in the second year, from which at least 1 ton 5 cwt. of fibre should be extracted, or a return of

* This process was fully described and the primitive machine illustrated in the "Queensland Agricultural Journal" for May, 1904, and January, 1906.—Ed. "Q.A.J."

£25 per acre gross. In the succeeding years there should be produced 3 tons 4 cwt. per acre, from which a gross return of £64 per acre may be expected; and, as the cost of harvesting and subsequent manipulation should not be heavy under the new system, this should leave a good margin for profit on the original outlay.

American ingenuity is being taxed to its utmost to cheapen the process of extraction, and a number of machines more or less successful are now on their trial.

A "crusher" has been invented in America for which it is claimed that it will handle the entire stalks of Musa in somewhat the same manner as sugar-cane is crushed. The crushed fibre and pulp come out fairly dry, and are lifted up about 12 ft. and then dropped into an ingeniously constructed dryer, where in 2 or 3 hours the crushed material becomes so dry that the pulp can be easily shaken away from the fibre.

These machines are being installed in the Philippines, and it is claimed for them that they, being light and simple in construction, can be easily shifted from place to place and thus deal with small planters' crops easily and cheaply; they will save 100 per cent. more fibre than under the old system; and that the price of the fibre will be well up to the average, as the process will actually produce a better article than that which has been subjected to the heavy strain of the old system of stripping.

This fibre would be cheaper than cotton for the manufacture of paper for the making of bags for the transport of flour, sugar, cement, &c.; and the demand for material for the making of cordage of all kinds and binder twine is increasing daily.

Certainly, where bananas are grown for their fruit only, there is an enormous waste of fibre in the stalks left on the ground; and as very often by-products have been known to be the means of lifting languishing industries to the front ranks of profit-making propositions, so these machines may be the means of largely stimulating the growing of bananas in Northern Queensland, and may assist in the opening up of the lands on the Daintree, Bloomfield, and other places out of reach of the existing central sugar-mills.

There is no reason why central crushers may not be established on somewhat the same terms as the central sugar-mill system and at a very much less cost. Such would enrich the country by keeping the money in it which at present is sent to other countries for the purchase of commodities which Nature has declared can be grown here.

If these machines can be adapted to the treatment of other fibre plants—such as sisal hemp and all aloes, bowstring, pineapple, blady grass, &c.—they may revolutionise the paper and textile industry generally, as many of the plants which we now look upon as noxious weeds may thus become sources of great wealth.

*Musa textilis* has been growing in Brisbane since 1862, and at Kamerunga State Nursery for the last 20 years, where plants can be obtained; and I have no doubt the Department could arrange for a supply of rootstocks of the best varieties from Mindanao, Philippine

Islands. Other varieties of this genus are known to produce most valuable fibre. In this country, at least three varieties of the wild banana are known to produce good fibre—not to mention many of the varieties of Musa at present cultivated only for their fruit.

To sum up:—The climatic conditions of North Queensland are in places favourable to the successful growth of the Musa varieties, as witness the wild banana, which is indigenous, and the fruit-bearing varieties which have been introduced. There is an ever-increasing demand for the fibre in every country and within the Commonwealth, and the sources of supply of the material from which paper is manufactured are every day becoming more limited.

The growing of the Musa, as has been shown, is neither a difficult nor costly undertaking, and is suitable for small settlers with little capital.

The cry is "People our Tropics"; and any new industry that can be started and conducted profitably must be a means to that end.

The plantation, once established, needs no expensive replanting for at least 15 years.

And, lastly, there is a vast area of the most fertile country in the world awaiting the axe of the pioneer, with timber on it which would in itself render the work of clearing profitable.

## PROSPECTS FOR QUEENSLAND.

Although the alluring prospect is held out to Queensland planters as to the profits to be derived from the production of fibre from *Musa textilis*, it must not be forgotten that the profit returns are based by Mr. Binnie on the results of the cultivation and manufacture of the fibre in countries where coloured labour is employed. In Queensland not only would field labour be needed, but also mechanical labour, and the latter with machines which, up to the present, have not proved satisfactory. To obtain 1 ton of banana fibre, it will be necessary to handle nearly 100 tons of fresh stems, as each trunk yields on an average a little under 1 lb. of fibre, and, under present conditions of extraction, two men cutting down plants and separating the fibre will not prepare more than 25 lb. per day. A number of machines for the purpose of extracting the fibre economically have been introduced, but none have come into general use. Taking 25 lb. of clean fibre as a day's work for two men, this means, at £30 per ton, a little over 3s. a day, exclusive of rations for workers. In a country where farm labour is reckoned at 8s. to 10s. per day, such a return would result in dead loss. Hence we cannot see how, in the absence of automatic machinery, the production of Manila hemp can be considered as a payable proposition for Queensland farmers.

Sir Daniel Morris, in a communication to the Jamaica Agricultural Society (Joun. Jam. Ag. Soc., x. 2, 1906) said: "A banana stem just after fruiting, if cut about 2 ft. above the ground and denuded of foliage, weighs 108 lb. This, being divided into lengths of 2½ ft. each and split longitudinally into several pieces, was prepared by beating and washing by hand, and yielded 25 oz. of clean marketable fibre, which

is at the rate of 1·44 per cent. of the gross weight. A smaller banana weighed 41 lb. This was divided into lengths of 2½ ft. each, and, after being split into several pieces longitudinally, was prepared by hand and yielded 6¾ oz. of clean fibre, or at the rate of 1·02 per cent. of the gross weight."

## ANOTHER NEW FIBRE DECORTICATOR.

We have received from the inventor the following description of a new machine ("La Française") for scutching sisal, flax, hemp, ramie, hibiscus, jute, banana, and other fibres, adapted to the above work. This cannot, however, be described as a new invention, since M. Félicien Michotte (the inventor) took out his final patents in 1910, after having spent some years in experimenting with mechanical decorticating of many textiles.

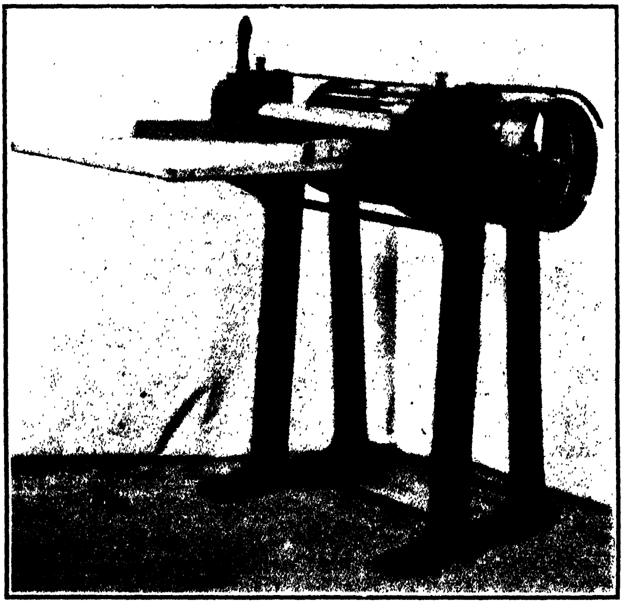


PLATE 29.—"LA FRANÇAISE" FIBRE DECORTICATOR.

The advantages claimed for this perfected machine ("La Française") are summed up as follows:—

(1) The machine can be regulated without difficulty for the treatment of leaves or stems, whatever their size, without any sorting out or grading.

(2) The machine may be set up to work in the field, and removed as the harvest proceeds to further portions of the estate.

(3) The mechanism and its working are so simple that it can be worked by the merest tyro. All the workman has to do is to spread the leaves or stalks on the running table, let them enter the machine, which automatically conveys them to the beater, when they emerge in the form of decorticated fibre.

(4) Care of the Machine.—" La Française" requires very little attention. A little oil supplied to spindles and axles, a little grease to the cog-wheels, and a general cleaning from time to time. Thanks to its strong and careful construction, no breakage can occur, and no irregularity has to be overcome; hence no special supervision is needed. All the parts are constructed of chosen materials—steel and bronze—thus assuring long service with a minimum of wear and tear.

(5) The machine is essentially portable. Its weight is less than 400 kilos. (900 lb.), which weight is easily divisible, as the machine can be taken to pieces by the simple unscrewing of some nuts. Thus it can be transported even to the most inaccessible localities.

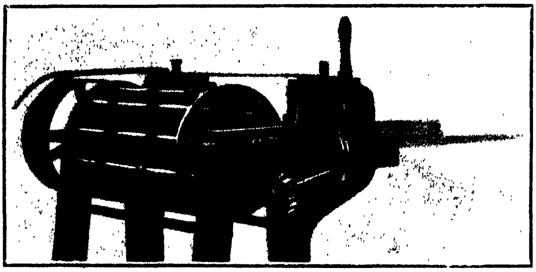


PLATE 30.—" LA FRANÇAISE." (INTERIOR VIEW.)

(6) The work performed by it is perfect, rapid, and economical. The leaves or stalks are treated by direct attack, and the decortication is effected in one passage through the machine.

The leaves are not worked off singly, but may even be passed through in bundles which are almost instantaneously decorticated and cleaned, without breakage or tearing out of the fibres, and practically without appreciable waste. Thus the leaves or stalks have not to pass through the beater several times, as is the case with other machines.

(7) A peculiarity of the machine is that in the case of leafy stalks no preliminary hand labour is required to remove the leaves (as, say, in the case of ramie). It effects this part of the work automatically.

(8) The motive power is economical. An engine of from ½ to 2 h.p. enables the employment of any sort of motor—steam, water, petrol, electricity, or horses. Finally, the build of the machine enables it to be easily set up on any kind of country.

" La Française" will treat about 1,200 kilos. (2,700 lb.) of dry leaves or stalks and 2,500 kilos. (5,620 lb.) of green in a day of 10 hours, producing about 150 kilos. (337 lb.) of dry fibre. Consequently it is equal to decorticating in 5 days the crop of a hectare (2½ acres) of hemp, representing 12,000 kilos. (27,000 lb.) of stalks or leaves.

As regards ramie, which valuable fibre has so far defied all machines, it is claimed for "La Française" that the ribbons are mechanically delivered as China grass, which is worth in the market from £45 to £50 per ton. The weight of green stems of this fibre plant treated in 10 hours is claimed to be about 10,000 kilos. (22,500 lb.), and a single machine can consequently treat in 7 days the crop from $2\frac{1}{2}$ acres, which averages 75,000 kilos. (168,750 lb.).

In the case of sisal and other agaves and aloes and the banana, the machine, by a simple modification of its parts, can treat all such textile leaves, provided they are not thicker than 4 to 5 centimetres (about $1\frac{3}{5}$ to 2 in.). Larger sisal leaves could, of course, be first passed through rollers and crushed; but this is also provided for in "La Française No. 2."

The quantity of fibre contained in these various textiles being very variable, the production of the machine varies from 150 to 350 kilos. (330 to 787 lb.) in 10 hours.

Total weight of the machine, 350 kilos. (875 lb.).

Height, 3 ft. 6in.; breadth, 3 ft. 3 in.

Price (at the works), complete, 1,400 francs (£58 10s.).

All information may be obtained from M. Félicien Michotte, engineer, 45 Avenue Trudaine Paris France.

# NEGLECTED INDUSTRIES.

## SILK WORMS AND HOW TO REAR THEM.

For a long time efforts have been made to establish the industry of silk production in this State. As far back as the early sixties some enthusiasm was exhibited in the suburbs and country districts in the neighbourhood of Brisbane, especially amongst the pupils of the State or, as they were then called, Primary Schools. In almost every country home silk worms were raised, mulberry trees were grown, and numbers of cocoons were produced. The writer once made up two small bales of Queensland cocoons obtained at Oxley Creek some years ago, and they were sold, if I remember rightly, at 12s. 6d. or 13s. 6d. per lb. The price of Queensland raw silk in the home market may vary from 2s. 6d. to 17s. per lb., according to colour-grading and other factors. The highest-priced silk in the European market is the Italian, which, according to a report by Messrs. Durant, Bevan, and Co., London, is worth from 18s. to 19s. per lb.

For young people the rearing and management of the silk worm is an agreeable and fascinating pastime, and country and suburban children would find both pleasure and profit in its cultivation. There is a very great demand for silk in America, in France, and other European countries, and even in India, which at one time used to export enormous quantities to Europe, yet where the production has dropped to 2,400,000 lb. annually, and now has to import for its own consumption some

240,000 lb. annually. In India the industry is entirely what it could be made in Queensland—a cottage one, carried on in their spare time by women and children. One woman with the help of a daughter can feed

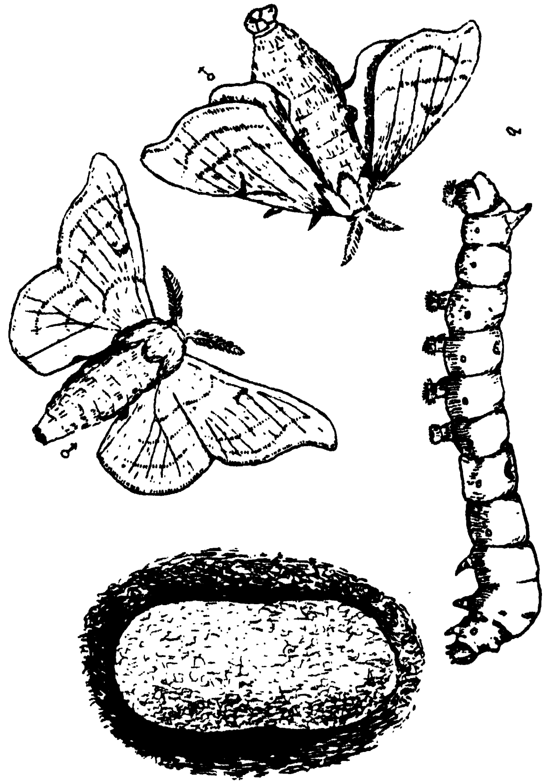


*Fig. 1.*

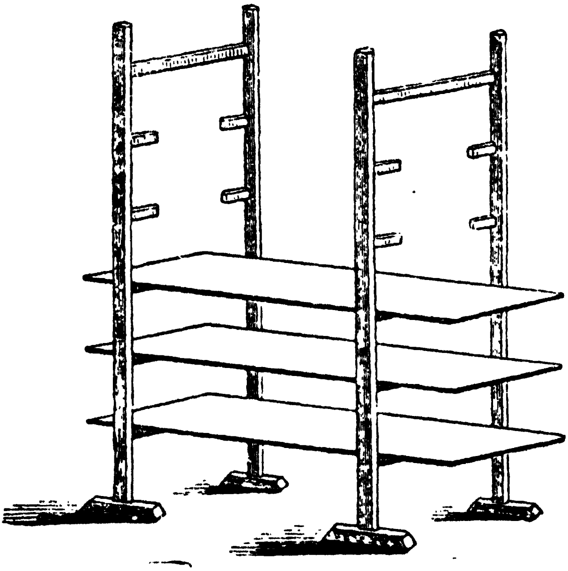
*Fig. 2.*

the produce of an ounce of eggs (about 40,000 worms) yielding within a month 82 lb. of raw cocoons, worth in that country about 37s. It will thus be seen that the margin of profit is small, and even with cheap

India labour the industry would not be a paying one with hired labour; but it would provide our boys and girls with a good amount of pocket money, without in the least interfering with their school work or household duties.

## HOW TO MANAGE THE WORMS.

The eggs should be placed in trays made of stiff white paper, and fully exposed to the heat of the sun, and should remain undisturbed



until they begin to hatch. As the young worms appear, they should be removed into other trays, and fed on mulberry leaves, the leaf of the white mulberry being the best for this purpose; but the black mulberry, lettuce, and young grape leaves also form good food—lettuce especially—for very young worms. They should now be kept in a room at a tempera-

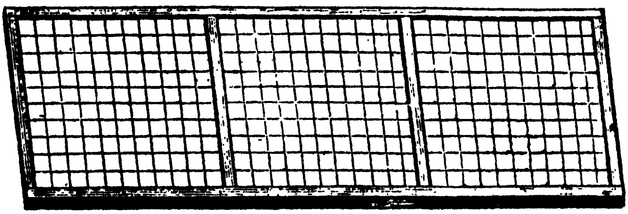


FIG. 1. —Wire-work shelf (after Roman)

ture of from 60 to 70 degrees Fahr., well ventilated and free from damp or too much dryness.

In lifting the worms from one tray to another, they should not be touched with the hands, but removed with a camel hair pencil. The caterpillar moults four times, each moulting taking four days, and thirty-two days after hatching it will have attained its full growth, when it will cease to eat and prepares to spin. There are several ways of

preparing a suitable place for the worm to spin its cocoon. One is to twist up a bit of writing paper in the form of a cornucopia, and affix it to the wall of the room. Into each of these, a single worm should be placed. Here it remains quietly whilst it spins its cocoon, within which lies the chrysalis. In Europe and Japan the worms are made to spin in straw crates or in sticks and grasses. On the fourth or fifth day after spinning, when the worms have changed into chrysalides within the cocoons, they should be collected from the paper receptacles or the other spinning places, keeping any double cocoons separate, as well as imperfect ones, as these cannot be spun.

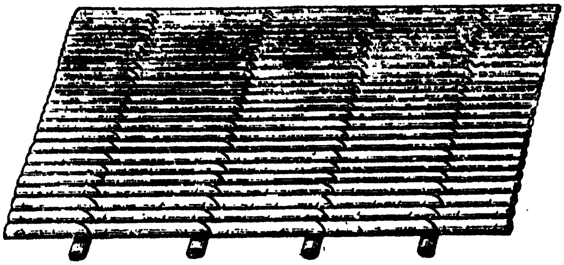


FIG. 1.—Shelf made of canes (after Roman).

When the spinning has been completed (in about three to five days, with another three days for the formation of the chrysalis), the chrysalis must be killed. This can be done in a Queensland summer by exposing the cocoon to the sun (in Europe they are steamed). In sun-drying, after the cocoons have been three days in the sun, they should be spread out thinly in the shade for a month, when the chrysalis inside will be perfectly dry, and the cocoons may then be kept for any length of time.

## VARIETIES OF SILK WORMS.

There are varieties of silk worms other than the mulberry worm. Such are:—The Tusser, which feeds on a variety of plants; the Muga; and the Eri (here depicted), the latter feeding on the common castor-oil plant and on the umbrella tree of North Queensland. The cocoons of the Eri are worth 3s. per lb. dried, and, what is of great importance, no exception is taken by buyers to pierced cocoons—*i.e.*, those from which the moth has emerged, so that there is no need to sun dry or boil the cocoons as in the case of the mulberry silk worm. One acre of castor-oil plants will support 600,000 Eri silk worms during the year—that is, six broods of 100,000 each. These, allowing for deaths, will produce 450,000 cocoons, and, as 1,600 Eri cocoons go to the lb., 1 acre of land will produce 300 lb., which, at 3s. per lb., amounts to £45. Roughly speaking, to put 1 acre under castor-oil and to rear the worms (out of doors on the trees) should not cost more than £15, leaving a net profit of £30 per acre.

## FEEDING.

There are no definite rules as to feeding, but whenever leaves become dry they should be removed, and this may be easily accomplished without disturbing the worms. They should never be handled. When it is

necessary to move them from the tray of dry leaves, all that is needed is to place a transfer tray of wire netting full of fresh leaves over the tray containing the worms, which will soon rise through the openings

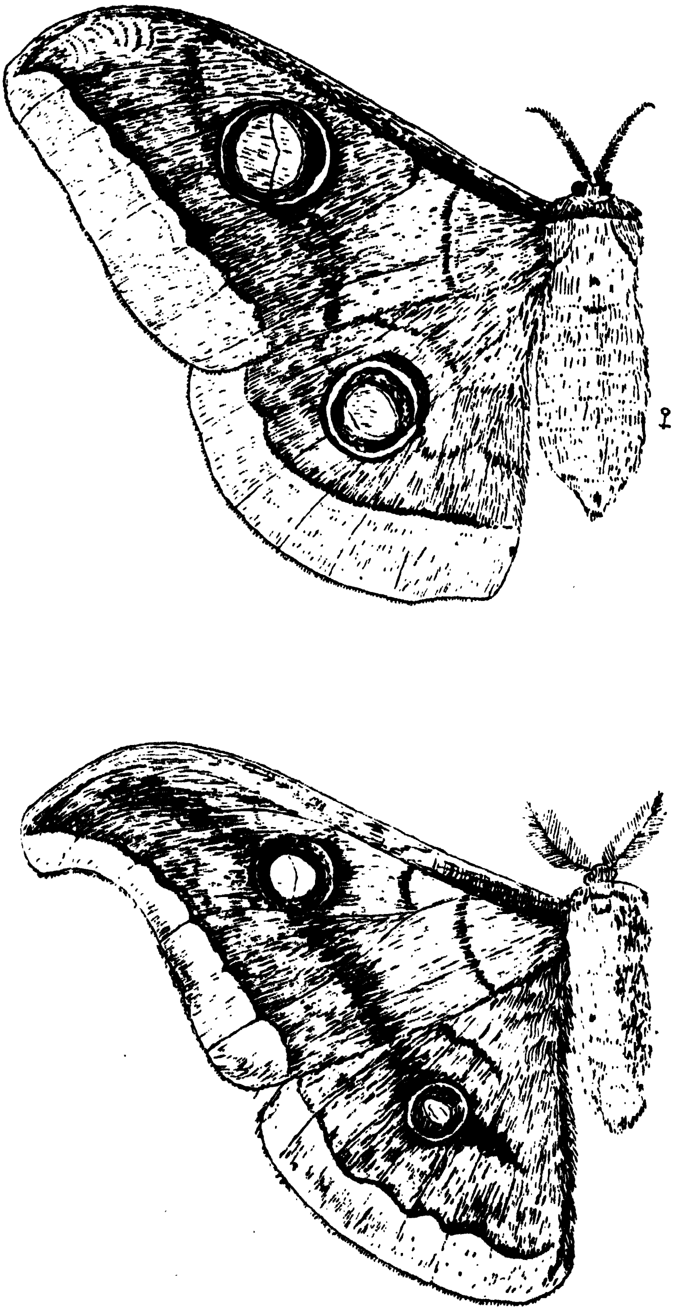



PLATE 31.—TUSSER MALE AND FEMALE MOTHS.

and abandon the old tray. For very young worms, shortly after their birth, the first transfer is made by the aid of mosquito netting, which is laid over the hatching eggs. On this netting leaves cut small are placed, and the tiny worms soon rise through the meshes, and may then be removed to a tray.

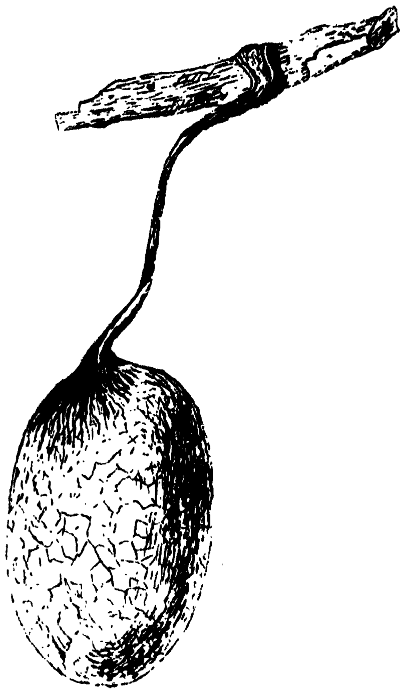


PLATE 32.—TUSSER COCOON AND WORM.

## REPRODUCTION.

Before killing the chrysalides in the cocoons, a certain number of the best—the firmist and best coloured—are put aside. In about three weeks the moths will emerge, and they are placed on a tray to lay their eggs as they please.

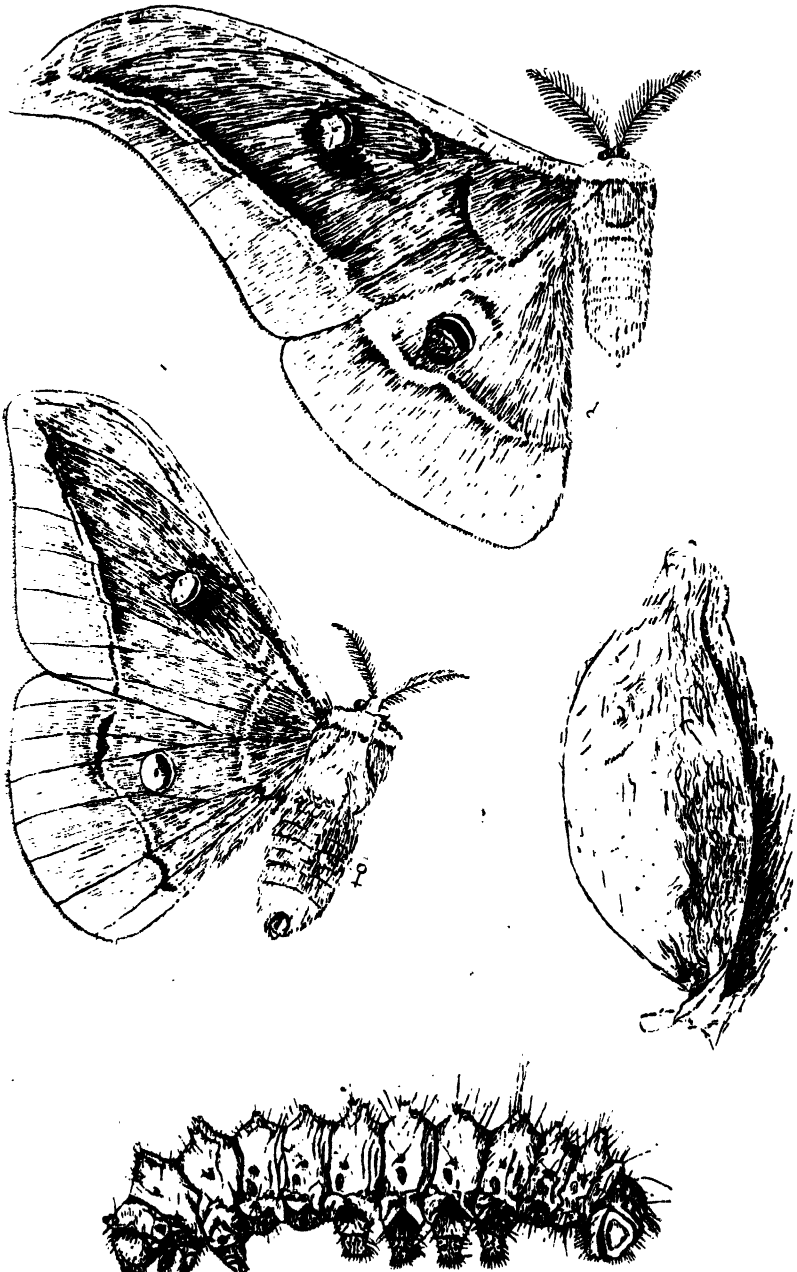



PLATE 33.—MUGA MALE AND FEMALE MOTHS, COCOON, AND WORM.

## FOOD.

Besides the mulberry, the silk worm will feed and thrive on the Osage orange, and, better still, on the Ramie plants, which will grow like a weed in Queensland all the year round. The result of feeding on Ramie leaves is larger cocoons and finer silk. The Ramie plant

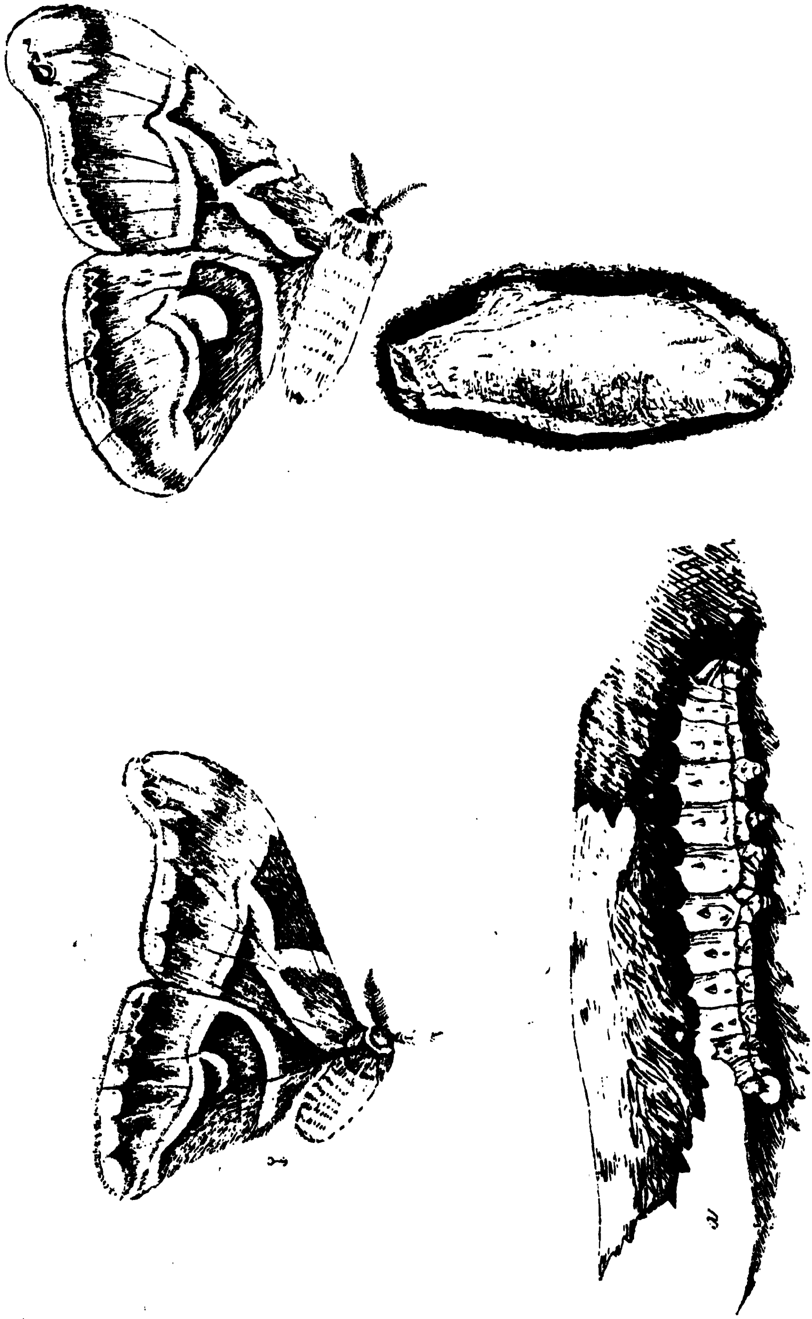


PLATE 34.—ERI MALE AND FEMALE MOTHS, COCOON, AND WORM.

(*Bœhmeria nivea*) belongs to the same natural order as the mulberry—namely Utricaceæ.

## SILK REELING.

From the cocoon, the silk is, by different processes, transformed into spun or reeled silk. We will describe this process briefly, but, as silk-reeling is a delicate operation, we think it better to advise silk-growers

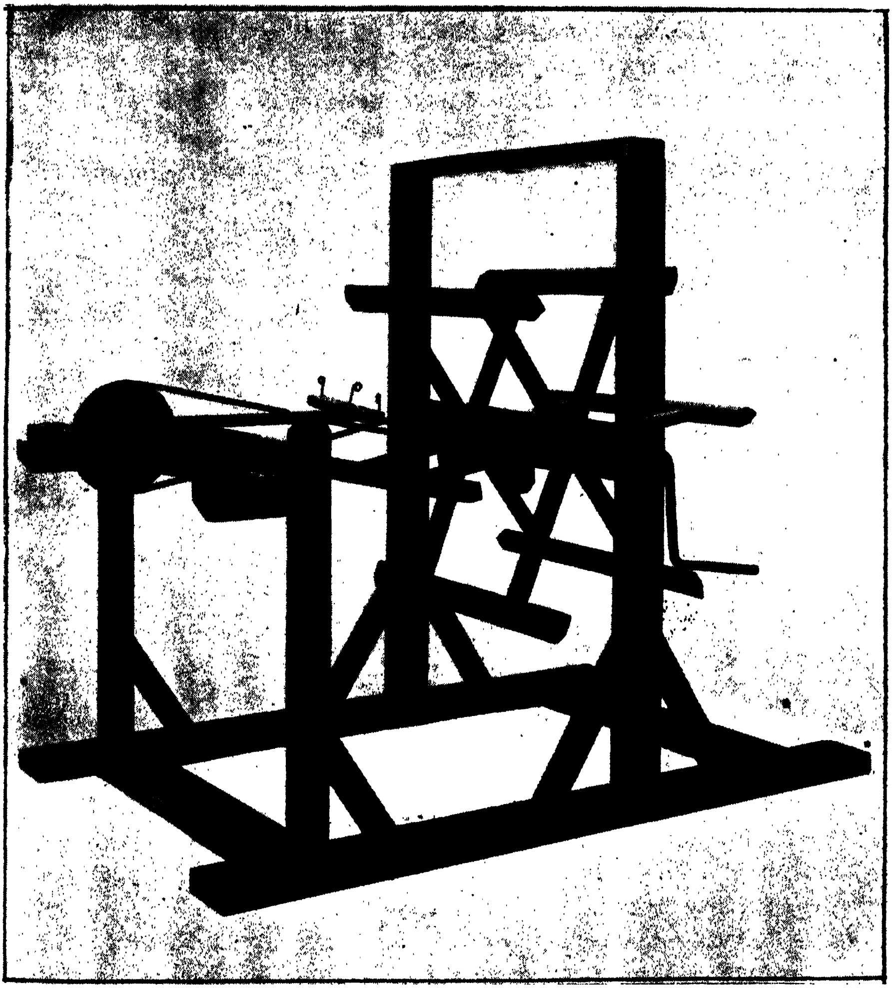


PLATE 35.—SILK-REELING APPARATUS.

to sell their cocoons rather than go to the trouble of reeling. Cottage-reeling appliances are procurable at a cost of about £10, but it is very questionable whether silk so reeled in small quantities would be marketable, because silk-reeling requires skill, and with small parcels of raw silk it would be impossible to get a uniform quality. The value of raw silk depends greatly on the uniformity of the threads, its cleanliness, tenacity, &c.; so that, of the four branches of sericulture—raising seed, feeding

the worms, producing cocoons, and reeling—producing cocoons seems to us to be the only one left which gives promise of being a profitable undertaking.

For those, however, who wish to reel their silk, we give the following short directions:—

To begin with, it is an utter waste of time and cocoons to attempt to reel off a few dozen. "Remember," says Mrs. South, "that it takes from 3½ to 4 lb. of cocoons to make 1 lb. of raw silk, and as about 600 cocoons go to the lb., it will require 2,400 of them to make 1 lb. of silk. So, rather than reel off a small number, choke the chrysalides, and keep the cocoons in a dry place, free from insects from one season to another, until you have a further supply large enough to make it worth your while to reel them off."

Mr. M. M. De, Sericulture Assistant to the Imperial Entomologist, Japan, has just published in Calcutta (Agricultural Research Institute, Pusa) a very interesting pamphlet entitled "Instructions for Rearing Mulberry Silk Worms" (Bulletin No. 39). In it he says that 80 lb. of green (raw) cocoons, if dried well, would be reduced to 27 lb., from which about 5½ lb. of raw silk and 2 lb. of waste may be obtained. The price in India of 80 lb. of green cocoons is about £1 10s.; 2 lb. of raw silk will be sold for £1; and 2 lb. of ribbon waste for 2s. 6d.

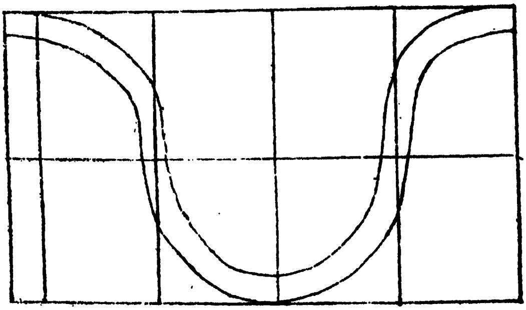
The apparatus here depicted scarcely needs description. The "spreader" on the small front shaft is intended to spread the silk evenly on the reel. By means of a spiral groove on the shaft, it moves transversely to right and left, working a skein 6 in. wide. The centre of the groove should be exactly in a line with the centre of the reel.

Three discs, as shown in the illustration, are used for twisting the single filaments into two threads. Besides the reeling apparatus, a tin or delft basin and a brush are required. Under the basin, which is partly filled with water, a spirit lamp is placed; and when the water boils the first lot of cocoons is put into it, but it must not be kept continuously at boiling point. The boiling is necessary to cook the cocoons, so as to soften their "glutin," and thus allow of their being unwound easily. During the reeling process, the water should be kept at a temperature of about 180 degrees Fahr. In India the cocoons are kept at the boiling point from 8 to 10 minutes. Under or over boiled cocoons yield inferior silk. The proper amount of boiling may be known by the cocoons feeling silky to the touch; and when one continuous thread comes from most of them, they may be considered as properly boiled. The cocoons should not lie over each other, but just cover the surface of the water.

Now with the brush (merely a small bundle of fibres from a millet broom) dab the cocoons under the water until the threads of each are

attached to the twigs. Take these in the left hand, and, with the right hand, keep drawing up, and putting into the left, all the floss silk till all the cocoons are attached by one clean thread.

Now take the threads of five cocoons and twist them between the finger and thumb, and pass this through the hole C in the upright as shown in the figure, then through an eyelet in the twisting appliance, next through the eyelet of the spreader, and thence on to the reel. Now take five other cocoons and do the same. There will then be two threads



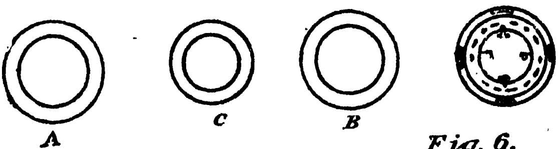
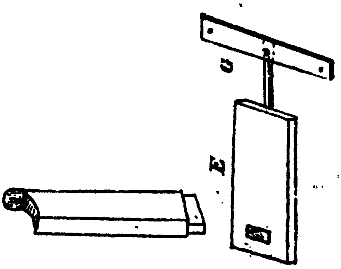



Fig. 6.



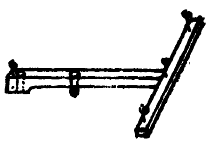



Fig. 8.

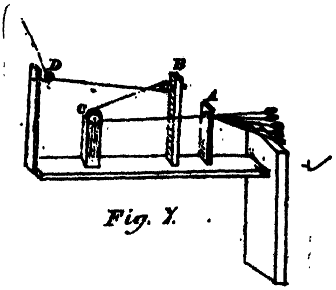



Fig. 7.

on the reel, and a twist must be given by turning the inner disc round from left to right six or eight times. This twisting of the threads is only done once at the start and after each break of the thread. Now start the reel. This requires two people—one to turn the reel, the other to attend to the cocoons. The reel must be turned in the direction away from the basin. The five cocoons forming each thread will now begin to unwind readily. As the reeling proceeds, the filament comprising each cocoon becomes so very fine that it would not bear the strain of reeling; therefore the threads, made up of five cocoons, will, by the time they are half unwound, require an additional cocoon. Then, if a break occurs, the two ends have to be brought together and tied with a very small neat knot.

After reeling, it is necessary to unwind the thread into skeins of standard length. This is called re-reeling, and it makes the raw silk soft and lustrous. The weavers prefer re-reeled to reeled thread. Imperfect, unreelable, and pierced cocoons can be spun on a special continuous spinning machine (the Pusa). Ribbon waste and waste cocoons are exported to Europe, and are also spun at Cawnpore and Bombay.

The spinning apparatus here shown may be seen in the museum of the Department of Agriculture and Stock, William street.

# Apiculture.

## BEES SENT BY PARCEL POST.

Mr. R. S. Nevill, late Tobacco Expert to the Department of Agriculture in this State, sends us the following clipping from the "Erie Daily Sentinel," Erie, Kansas, U.S.A., showing the extent of the bee-keeping industry in parts of the United States:—

"Parkertown, O., 17th April.—Uncle Sam's parcel post will carry about 6,000,000 queen bees from this place the coming summer in small packages destined to all parts of the civilised world. H. G. Quirin, who operates perhaps the largest bee farm in the United States, estimates his orders will call for that number of queens. Last year Quirin shipped queen bees with their 'escorts' of working bees in little parcel post packages to all parts of America, Europe, Japan, Cuba, China and the West Indies.

"Quirin has raised queens he valued at 300 dollars. These, however, were extraordinary stock. The regular stock are worth from 1 dollar to 3 dollars. In addition to his queens, the bee magnate expects to have employed about 50,000,000 workers the coming season making many tons of honey."

# Botany.

## CONTRIBUTIONS TO THE FLORA OF QUEENSLAND AND BRITISH NEW GUINEA.

BY F. MANSON BAILEY, C.M.G., F.L.S., Colonial Botanist.

### Order MELIACEÆ.

DYSOXYLON, Blume.

**D. cerebriforme,** *Bail.* (Plate 36). To the description in Queensland Botany Bulletin, XIV., p. 7 (Plates 1 and 2), and in the "Queensland Flora," page 232, add:—

Flowers in dense short panicles in the upper axils of the branchlets, branches pubescent. Calyx pubescent, 3 lines long, with 5 broadly triangular teeth. Petals silky pubescent outside, about ½ in. long, adhering to the staminal tube for about one-third of their length.

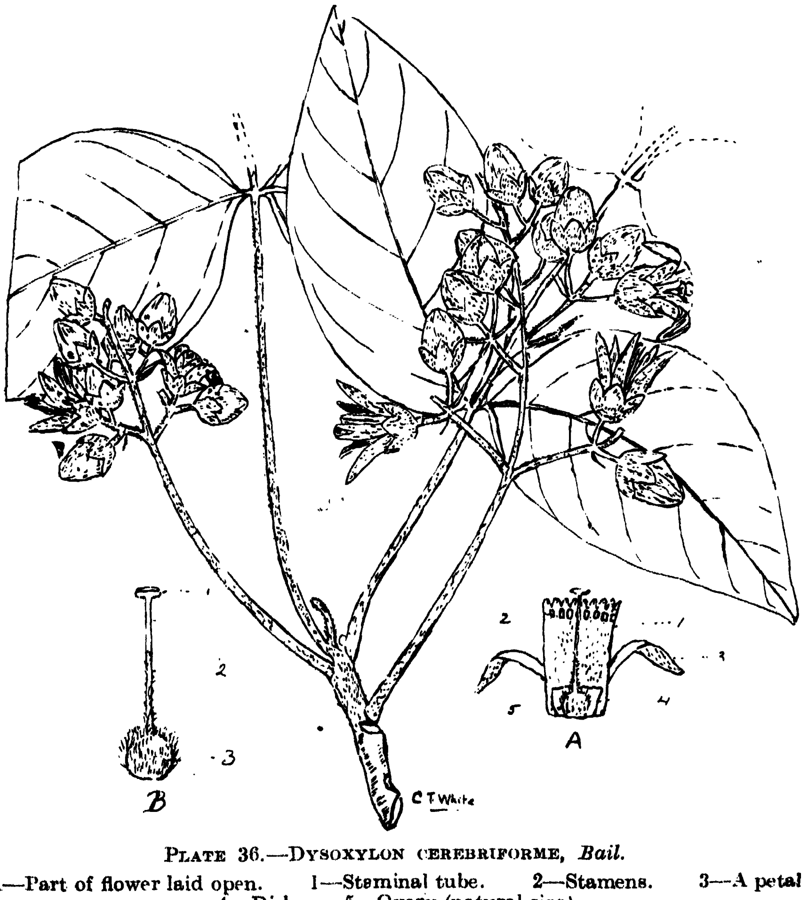



PLATE 36.—DYSOXYLON CEREBRIFORME, *Bail.*

A—Part of flower laid open. 1—Staminal tube. 2—Stamens. 3—A petal. 4—Disk. 5—Ovary (natural size).

B—Pistil. 1—Stigma. 2—Style. 3—Ovary (enlarged).

Staminal tube truncate with 10 short teeth. Disk broadly tubular, glabrous, ovary very hirsute. Style pubescent in the lower half. Stigma flat and broad.

Hab.: Atherton, *H. W. Mocatta*, May, 1914.

I have been enabled to complete the description of this valuable timber tree from some specimens lately received from the Director of Forests (Mr. N. W. Jolly), collected at Atherton by the District Forest Inspector.

## Order LEGUMINOSÆ.

### INDIGOFERA, Linn.

**I. subulata,** Vahl. in *Poir.* Encyl. Meth, Supp. iii. 150 (1813). Perennial, with very long, slender, sub-scandent stems, branches numerous, ascending or spreading, striate, nearly glabrous, when young with white appressed hairs. Leaves imparipinnate; rhachis 1 to 2 in. long, slender, hoary; stipules filiform; leaflets 5 (2 pairs and end one), stalked, readily disarticulating, oval, obtuse, apiculate, hairy on both sides, paler beneath. Flowers small, on short, strongly curved pedicels, numerous in very long-stalked, slender, spicate racemes, exceeding the leaves, Calyx segments setaceous. Pod 1½ to 1¾ in., linear, slender, deflexed at base, curved outwards, and divaricate, sharp-pointed sub-quadrangular, nearly glabrous, not torulose. Seeds 8 to 12—Hook., Fl. Br. Ind., vol. ii., 96; Trimen, Handbook. Fl. Ceylon, ii., 25; *I. flaccida*, Koen.; Wight, Ic., tab. 387.

Hab.: A native of South India, Tropical Africa, and America; now naturalised if not truly indigenous to Queensland at Hughenden. Specimens received from *Mr. Wm. Price*.

## Order MYRTACEÆ.

### EUCALYPTUS, Lher.

**E. amygdalina,** *Labill.* Pl. Nov. Holl. ii., 14 t. 154. A tall straight tree; bark of trunk persistent, of the branches deciduous; branchlets slender. Leaves thin, mostly straight and under 1 in. broad and from 3 to 4 in. long; acuminate when long, the short ones usually broad and often blunt and apiculate; venation faint. Lateral nerves usually very oblique and irregular and at times almost inconspicuous like the reticulate ones. Intra-marginal nerve distant from the edge. Base of leaf tapering into a slender petiole from ½ to 1 in. long. Peduncles axillary and lateral, appearing at times paniculate, terete or nearly so, with about 4 to 8 rather small flowers. Buds ovate, glandular. Calyx tube turbinate, about 1 line diameter, the pedicel of equal length. Operculum slightly pointed. Stamens under 2 lines long, all perfect. Anthers small with diverging confluent cells. Ovary flat-topped. Fruit subglobose-truncate, and under 2 lines diameter; the capsule not at all or only slightly sunk; valves flat.—Benth. Fl. Austr., iii., 202.

Hab.: Chinchilla, *R. C. Beasley*, who says "Growing on gravelly hill near brigalow scrub. Trees mostly tall and straight. Local names 'Malle Box' and 'Silver-leaf Box.'"

From the above description it will be seen that the Queensland plant differs but slightly (mainly in the size of flower and fruit) from the more southern forms.

## Order CUCURBITACÆ.

### CUCUMIS, Linn.

***C. metuliferus,** *E. Meyer.* Habit resembling that of the cucumber. Leaves alternate; petiole 1 to 4 in. long, blade 3 to 5-lobed, 2-5 in. long and as much broad. Tendrils simple. Flowers 1-sexual; males in clusters, females solitary; the ovary with spinulous tubercles; male peduncles 2 to 10 lines long, females ¾ to 1¾ in. long. Calyx with an obconic-campanulate tube, 2 to 2½ lines long; teeth subulate, half as long as the tube. Corolla 5-lobed, 1¼ to 1½ in. wide, yellow; lobes obvate, obtuse. Stamens 3 very short, anthers oblong, 1 to 1½ line long, finely citiate, with crenulate apical crests. Style 2 lines long; stigma large, 3-lobed. Fruit 2½ to 5 in. long, 1½ to 2½ in. thick, oblong or ellipsoid, bluntly 3-gonous, beset with thick narrowly conical spines ¼ to ½ in. long, rich scarlet when ripe. Seeds ¼ in. long, ovate, smooth, faintly margined.—Harvey and Sond., Fl. Cap. ii. 495; N. E. Brown, Bot. Mag., Tab. 8385.

Hab.: A native of South Africa, now naturalised about the Barron River and Russell River road, Tropical Queensland, *E. W. Bick.*

## Order RUBIACEÆ.

### GARDENIA, Linn.

**G. Kershawii,** *Bail, Sp. nov.* (Plate 37.) Young branchlets resinous, stipules particularly so. Leaves lanceolate 3¾ in. long, 1 in. broad, pubescent, especially on the under surface; lateral nerves numerous, parallel; petioles ¼ in. long, pubescent like the lateral nerves and branchlets. With regard to the inflorescence, that of the only specimen available for description seemed to be somewhat abnormal, the flowers were four in number, and seemed to be three and an odd one. Calyx ½ in. long, densely hirsute; calyx lobes 6 or perhaps 7, subulate, hispid, of about 2 lines. Corolla tube 1 in. long, hairy, scarcely dilated upwards; the lobes 7 as long as the tube 2 lines broad; margins ciliate. Anthers ½ in. long; style slightly exceeding the carolla tube; stigmatic lobes short.

Hab.: Claudie River, *Jas. A. Kershaw.*

## Order ORCHIDEÆ.

### EULOPHIA, R.B.

**E. papuana,** *Bail.* Ql. Agric. Jl., xix. (1907), p. 273 (Plate 38). A plant received some time ago by the Director of the Brisbane Botanic Gardens, collected in British New Guinea by Mr. T. H. Wells, has recently flowered; and the opportunity has been taken of giving a figure of the plant.


PLATE 37.—GARDENIA KERSHAWII, *Bail.*

A—Flowering shoot. B—Corolla laid open. $b^1$—Style $b^2$—Stigma.

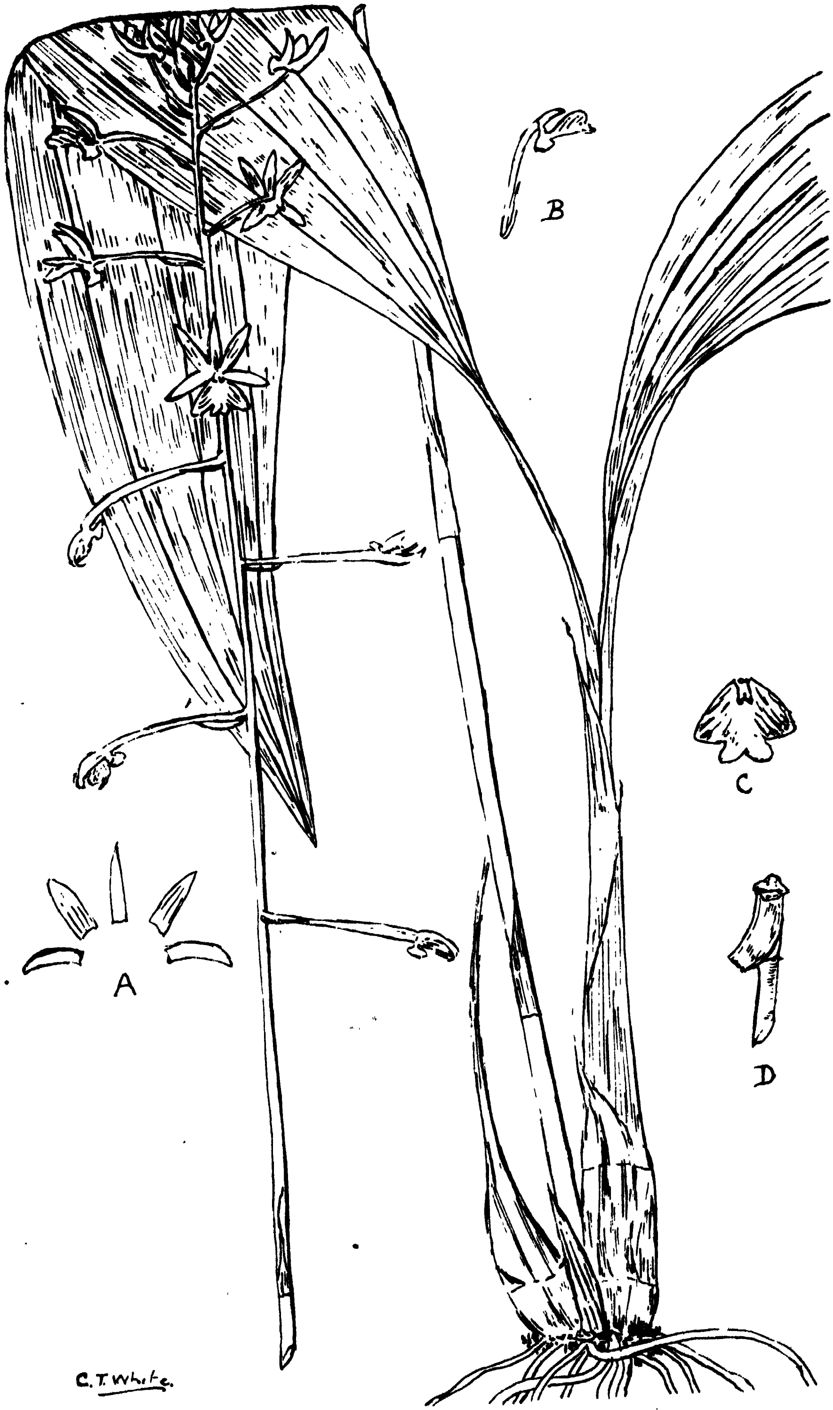



PLATE 38.—EULOPHIA PAPUANA, *Bail.*

A—Sepals and petals. B—Side view of labellum. C—Front view of labellum. D—Column. A, B, and C—Natural size. D—Enlarged.

## Order LEMNACEÆ.

### LEMNA, Linn.

**L. polyrrhiza,** Linn. (Plate 39). The large Duck-Weed. Fronds very broadly ovate or most frequently orbicular, mostly about 3 lines diameter, rather thin, but more herbaceous than most species, and often darker coloured, emitting from the underside a cluster of several, often many, rootlets. Bract of the flower saccate. Anthers and the apex of the ovary spotted.—*Spirodela polyrrhiza,* Hegelm.

Hab.: Eidsvold, *Dr. T. L. Bancroft.* This is a very widely spread species, but not previously met with in Queensland, although it has been found in Victoria and New South Wales.

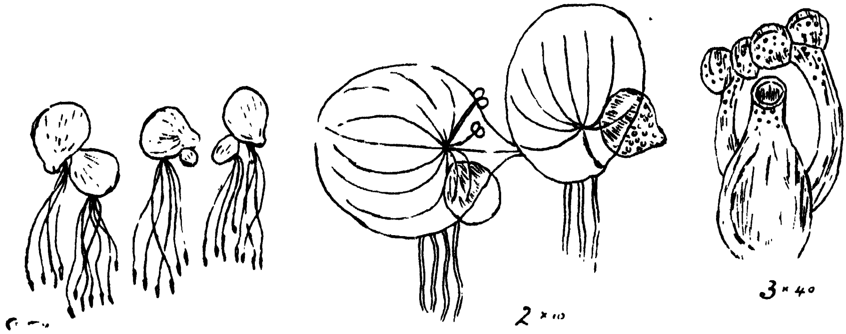


PLATE 39.—LEMNA POLYRRHIZA, *Linn.*
1—Plants (natural size). 2—Flowering and fruiting plants (enlarged). 3—Ovary and stamens (enlarged). 2 and 3—After Hegelmaier.

## Order CHARACEÆ.

### CHARA, Linn.

**C. contraria,** *Kuetz.*

Hab.: Currumbin Creek, *C. T. White,* November, 1911.

The above addition to our Characeæ has been determined for me by Mr. James Groves, London.

## Order FUNGI.

The following additions to our Fungi and Algæ have been determined at the Royal Botanic Gardens, Kew, England:—

### GASTEROMYCETEÆ.

**Geaster tenuipes,** *Berk.* (*G. plicatus,* Berk.).

Hab.: Eidsvold, *Dr. T. L. Bancroft.*

### PYRENOMYCETEÆ.

**Phyllachora maculata,** *Cooke.*

Hab.: On leaves of *Eucalyptus,* Darra, *C. T. White.*

**Scirrhia cyperi,** *Wakefield* (in letter).

Hab.: On stems of *Cyperus polystachyus,* Nudgee, *C. T. White.*

**Parodiella perisporioides,** (B. et C.) *Speg.*

Hab.: On leaves of *Crotalaria sp.,* Gilbert River, *E. W. Bick.*

**Ceratostoma australe,** *Speg.*

Hab.: On dead rhachis of a palm, Brisbane, *J. H. Simmonds.*

### HYPHOMYCETEÆ.

**Aspergillus candidus,** *Link.*

Hab.: On pods of garden pea (*Pisum sativum*), Brisbane, *F. M. Bailey.*

## Order ALGÆ.

* **Caulerpa anceps,** *Harvey.*

Hab.: Moreton Bay, *J. H. Simmonds.*

# Entomology.

## THE QUEENSLAND FRUIT FLY, AND HOW TO DESTROY IT.

By A. A. SMITH, Wellington Point.

In dealing with this subject it is necessary to mention its life history. Whether the fly is a native of Queensland, I am not prepared to say; but that it attacks a large number of our fruit is beyond question, and also that there are a few it is very partial to, such as the common yellow guava, some varieties of plums, eating pears, and peaches. The fly deposits her eggs well under the skin of the fruit, and, according to Mr. Tryon, if the fruit is in a favourable degree of ripeness, the eggs hatch out very quickly, and in three weeks develop into flies. Now, I will proceed to deal with some ideas and statements that have been made for years. Some people think the fly breeds very much in our wild fruits, but I beg to differ from that view, unless such fruits are very much isolated from cultivated fruits. My reasons are that I have noticed that practically all insects, animals, and birds, in nine cases out of ten, will seek out the best fruit they can find. Having grown strawberries for a number of years, I have noticed that, wherever there was a nice large berry and two or three smaller ones on a plant, the large one would be attacked; and, to bear out my views, I quote the statements of two gentlemen at a meeting held at Redland Bay some time ago. One of them said he knew of a case where cultivated orange trees had proved more subject to the pest than those allowed to go under grass. Another that their cultivated trees had been attacked worse than those not so thoroughly cultivated. In dealing with some ideas which have been suggested for its destruction, it appears that the idea most favoured is one by means of trapping; but the trouble appears to be the difficulty in destroying it without a great amount of time and trouble. In the "Queensland Agricultural Journal" for July, 1906, appears an article by Mr. S. C. Voller, of Enoggera, in which he states that in one season he saved nearly the whole of his orange srop by catching the fly by hand, and in another part of his article he deals with the matter of destruction by the use of certain forward or early maturing trees as trap-trees, as the fly will always be found on such trees in force before it spreads to give its attention to the rest of the orchard. The process here is to go and catch the fly by hand and kill it on the spot. I think it was Mr. Benson who advocated hanging up ripe fruits in trees throughout the orchard to attract the fly, and when infested to destroy them. Again, it has been recommended to plant a number of guava trees in a selected place, fence it in, and when the fruit is ripening to place one to two pigs in it to eat the fallen fruit. Now, as a fruit-grower I have taken a great deal of interest in this subject for some time, and, in carefully studying numerous ideas and statements and with experiments lately conducted by me, I have arrived at the conclusion that this pest can be very simply controlled by a method I have adopted (and which will

eventually be placed on the market); but to do so, I agree with others that it will have to be done by concerted action by all growers and by the Government. An Act must be put in force prohibiting, under penalty of a fine, people from allowing infested fruits about the premises (unless for the distinct purpose of a trap for destruction of the pest). To all those who are not conversant with the life habits of the fruit fly, I wish to say that larvæ or maggots always leave the fruit when fully developed and fall to the ground, where they hide and turn into a little brown chrysalis, and then into a fly in a very short space of time. I am satisfied there need not be any breeding of the fly in commercial orchards, for the reason that a great deal of the fruit is gathered before the maggot develops, and whatever fruits are infested can easily be destroyed, as can any fallen fruits. Now, coming to my method of destruction, which is by creating a permanent trap or traps, according to the size of the orchard, by planting at convenient spots, an early, middle, and late ripening fruit, dwarfing the trees, and making them as attractive as possible; and other ripe fruits, which are more attractive to the fly than those partly ripe can be placed there as well, and the fly is allowed to deposit all the eggs there, after which, by my method, when placed in position, every maggot is destroyed as it emerges from the fruit. In my experiment, in a small way, seventy fully developed maggots, besides a number of undeveloped ones, were destroyed from three guavas. I am preparing a trap myself with a peach and Red Heart Plum to catch the first broods of fly, and the guava for a later brood of any that escape the first.

## SNAILS IN THE GARDEN AND BUSH-HOUSE.

Snails (says the "Journal d'Agriculture Tropicale") are a veritable plague in some hot countries, and are particularly numerous during the months of December and January. They live from 4 to 6 months, and in the daytime remain hidden in damp, dark places, coming out at nights to carry on their depredations on whatever vegetable life is within their reach. They lay about 80 eggs in heaps of dead leaves, and these hatch out in from 25 to 30 days—according to the species. In the State of San Paolo they are captured by hand, and the high-growing plants most subject to their attack are surrounded by a rope of tarred piassava. Low-growing plants are sprayed with a 4 per cent. solution of sulphate of copper, and pasture lands with a 1 per cent. solution of bay salt. Ducks and crows readily devour them. The Glandinas, or carnivorous snails, will devour from 15 to 30 of the pests a day. These Glandinas (*Gl. nana, stigmatica, liquaria, fusiformis, guttala, vanuxenensis, aurata, miradorensis*) live in open, damp places, and are perfectly harmless to plant life. Hence they have been successfully introduced into the South of France and into Tunis, where they are found very useful in vegetable and flower gardens, and in bush-houses, in destroying the numerous snails.

[Once the snails in a garden or elsewhere have been thus destroyed, one is apt to wonder whence these carnivorous molluscs obtain a supply of food, unless they devour one another.—Ed. "Q.A.J."]

# Animal Pathology.

## FACTORS INFLUENCING EFFICACY AND DETERIORATION OF CATTLE-DIPPING FLUIDS.

BY J. C. BRÜNNICH, F.I.C., AND F. SMITH, B.Sc., F.I.C.

A study of factors influencing efficacy of dipping fluids requires, in the first place, a knowledge of the manner in which cattle ticks are killed by the application of the chemical. Practical work in this direction has been carried out by Messrs. William Cooper and Nephews in South Africa, and the conclusions drawn from the results are given in a pamphlet issued by that firm (1).

Three theories are mentioned as generally advanced by different workers—

"HOW TICKS ARE KILLED."

1. That the tick absorbs the poison through its own skin while the animal is in the dipping bath.
2. That the absorption of the poison through the skin of the tick takes place after dipping.
3. That the poison is absorbed by the skin of the animal, and that the tick sucks in the poison with the fluids extracted while feeding on the animal.

The authors regard the third theory as correct, as supported by practical field experiments, and give as chief contention the theory that the living cells, forming the deeper layers of the skin, have an actual affinity for arsenic; that the poison is arrested and fixed in them, and thus prevented from reaching to circulating blood; and that the ticks take in the poison with the blood and lymph passing through these layers of the skin, which are saturated with arsenic.

Our own experiences, however, force us to the conclusion that only a combination of 2 and 3, when using a dipping fluid, with *a minimum* amount of arsenic, kills all ticks on an animal in a few days. A number of experiments were carried out to prove this theory.

In the first place, we proved that the arsenic of the dipping fluid is rapidly absorbed through the skin of the animal, and goes into circulation within a few hours. The steers experimented with, at the Stock Experiment Station, Yeerongpilly, were not dipped, but the dipping fluid (the Queensland Government formula) was applied by spraying, so as to avoid any possible intake of arsenic by accidental swallowing of the dipping fluid. Blood drawn from the animal before dipping showed no or only the faintest traces of arsenic. Two hours after dipping, the blood already gave distinct reaction for arsenic, the amount had increased rapidly at the four hours' interval, and diminished again up to twenty-four hours after dipping. The repetition of this experiment gave exactly the same results.

For further experiments two young heifers, fairly well infested with ticks, of various stages of development, were selected, and kept under observation in a stable.

On small areas of the skin the following trials were made:—

1. Ticks painted carefully with dipping fluid, with the aid of a camel-hair brush, without wetting skin of the host;
2. Skin of host wetted with dipping fluid without wetting ticks (neglecting, of course, small larval ticks);
3. Small quantities of dipping fluid (5cc.) were injected subcutaneously; and, lastly,
4. Larger areas of skin with ticks were thoroughly wetted with dipping fluid.

No ticks were killed in either experiments 1, 2, or 3, although in 1 and 3 some of the ticks appeared to sicken, whereas in experiment 2 ticks showed hardly any effect of the poison, and all increased rapidly in size. Even in experiment 4 some ticks were still alive after five days, although the majority, from 80 to 90 per cent., were killed.

It is a very well known fact that when dipping animals small areas of skin, as, for instance, on the top of the head, escape immersion and are left unwetted, the ticks on these areas will not be killed, showing that the poison absorbed by the ticks from the blood of the animal is as a rule not sufficient to kill. Dipping fluids of greater concentration may kill such ticks, but the fluid would be dangerous to the host. Again, partial wetting of the animal, as in experiment 4, cannot be absolutely effective, because the total amount of arsenic going into circulation is too small to have any additional effect on the ticks of the sprayed areas.

The efficacy of any dipping fluid depends largely on its power to thoroughly wet the skin of host and of tick, leaving a uniform thin film of liquid adhering to the skin. Solutions which contain no emulsifying agent, pure sodium arsenite solutions, recommended by many for dipping purposes, do not form a continuous uniform film of liquid on the surface of the hide of the animal and body of the tick, but the liquid will run together and collect in form of drops. It is quite self-evident that such solutions cannot be as effective as others which contain emulsifying agents. This has been proved by practical experiments carried out in Queensland, South Africa, and elsewhere. Furthermore, sodium arsenite, or solutions of arsenious acid and caustic soda, in these conditions appear to have a severe local scalding action, perhaps largely due to the fact of running together and forming larger drops which act more severely on the skin of the animal than a uniform fine film of liquid.

Watkins Pitchford's bath (schedule II.) contains 20 lb. of arsenite to 400 gallons of water, his laboratory dip 8½ lb. to 400 gallons; the latter because it contains an emulsion was as effective as the former, without having its irritant qualities (2).

The Queensland Government formula, as originally prepared, contained tar and tallow, dissolved by the aid of caustic soda, as emulsifying agent, and these ingredients may be effectually replaced by other substances, oils, resins, &c. It has also been found that the quantity of such

agents can be very much reduced and still give good results. The amount of Stockholm tar, which was originally 2½ gallons per 400 gallons of fluid, has now been reduced to half a gallon without interfering with the efficacy of the fluid. The formula may also be prepared in the form of a concentrate, as it readily mixes with the necessary amount of cold water to make a fluid of standard strength.

There is but little to choose between the different proprietary mixtures of dipping concentrates now on the market, as long as they contain the right amount of arsenic and the necessary amount of emulsifying agent.

One firm of manufacturers has claimed superiority of their preparation over the Government formula dip, based on greater wetting power, due to a lower surface tension of the fluid. The wetting power of any liquid, or the property to form a uniform film upon a greasy surface, depends primarily on its surface tension. The size of drops formed by liquids running out of a small orifice may be taken as a measure of their surface tension; liquids with low surface tension forming proportionately smaller drops. Even a rough preliminary test showed that the Government formula dip had a much smaller surface tension than the proprietary mixture in question, and even when diluted with two parts of water the surface tension was still smaller, and the wetting property therefore higher than that of the proprietary liquid in undiluted form.

In order to bring this matter to a finality, a series of experiments were carried out, in which the surface tensions of solutions of different recognised or supposed emulsifacients were determined, by observing the number of drops formed, when a measured quantity of liquid was allowed to run through a fine opening.

TABLE I.

| Liquid. | Number of Drops from 2 cc. |
|---|---|
| Water | 34 |
| ·2 Per cent. arsenite solution | 34 |
| ·2 Per cent. oleic acid soap | 83 |
| ·2 Per cent. stearic acid soap | 42 |
| ·2 Per cent. resin soap | 55 |
| ·2 Per cent. Stockholm tar soap | 51 |
| ·15 Per cent. tar soap | 48 |
| ·2 Per cent. sodium cresylate (phenolic bodies) | 36 |
| ·2 Per cent. sodium phenylate (phenolic bodies) | 34 |

The amounts of soap used are approximate to the proportions of the Queensland Government formula. The higher amount of tar with sufficient soda to render a homogenous solution was used in order to make its concentration comparable. The points brought out are—

1. The superiority of oleic acid soap, such as is obtained from saponification of oils, over the stearate soaps of tallow.

This is accounted for by the partial insolubility of the latter at ordinary temperatures, the solutions appearing cloudy from precipitation of stearate or acid-stearate. (See the work of Hillyer (3), who finds palmitic acid soap solutions to behave similarly.)

We are led to recommend, therefore, the preference of saponifiable oils in place of tallow in the preparation of dipping solutions and concentrates.

2. The fair efficacy of resin soaps.

3. The considerable efficacy of Stockholm tar as an emulsifying agent.

4. The inoperativeness of phenolic bodies as emulsifying agent.

A further series of experiments was conducted to test the influence of the acid arsenite of the Departmental formula upon the soap emulsifying agents above, as it was expected that their efficiency would be effected through diminution of the effective neutral soaps by liberation of their constituent acids. Two arsenite solutions were employed:—(A) $As_2O_3$ and NaOH in proportion to give the total alkaline content approximating to that of the Government formula, which contains insufficient alkali above that of the neutral soap, to completely satisfy the arsenious acid radicle, and in which acid arsenite (or free arsenious acid) must be considered to exist. (B) A solution containing $As_2O_3$ in combination with additional NaOH to give trisodium arsenite $Na_3AsO_3$. These are distinguished in the following table as "Acid" and "Neutral arsenite."

TABLE 2.—WETTING POWER OF DIPPING FLUID WITH NORMAL AND INCREASED ALKALI.

| Liquid. | Number of Drops from 2 cc. |
|---|---|
| Acid arsenite + ·2 per cent. oleic acid soap .. | 82 |
| Neutral arsenite + ·2 per cent. oleic acid soap .. | 72 |
| Acid arsenite + ·04 per cent. stearic soap + ·16 per cent. oleic soap .. .. .. | 76 |
| Neutral arsenite + ·04 per cent. stearic soap + ·16 per cent. oleic soap .. .. .. | 63 |
| Acid arsenite + ·2 per cent. resin soap .. .. | 56 |
| Neutral arsenite + ·2 per cent. resin soap .. | 63 |
| Acid arsenite + ·1 per cent. tar soap .. .. | 46 |
| Neutral arsenite + ·1 per cent. tar soap .. | 48 |
| Acid arsenite + ·2 per cent. bone oil soap .. | 55 |
| Neutral arsenite + ·2 per cent. bone oil soap .. | 54 |

In the case of the oleic and the mixed oleic and stearic acid soaps, the opposite result to that expected is shown, the solution containing acid arsenite possessing appreciable higher emulsifying power. Hillyer (3), however, states that neutral soap solutions do not show increased emulsifying power with excess of alkali. Our results show that there is a definite depression which we would attribute to the formation of basic soap compounds. In the case of resin marked cloudiness was noticed on admixture with the "acid arsenite," the weaker resin acid evidently being liberated, excess alkali in the case of the neutral arsenite by preventing this destruction of soap giving a fluid a markedly higher emulsifying power. Tar soap solutions seem little affected by excess of alkali.

In view of these findings we do not consider an increase of the proportion of alkali in the compounding of the Government dip formula necessary. In case of use of resin soap probably an excess of alkali would be advisable.

An extension of the observation to bone-oil, an ingredient in a new formula under consideration, shows that this substance also possesses considerable emulsifying power.

A further study was made upon the influence of hard water upon the wetting power of dipping solutions, the effect being tested upon solutions containing " acid " and "neutral arsenites."

The arsenite-soap-tar solution of double the standard strength was diluted with an equal quantity of water, showing a hardness of 100 on Clark's scale, an effect equal to the compounding of fluids from commercial concentrates by dilution with water of hardness 50, a much softer water than many that are undoubtedly employed in practice.

TABLE 3.—WETTING POWER OF DIPPING SOLUTIONS MODIFIED BY HARD WATER.

| Liquid. | Number of Drops from 2 cc. |
|---|---|
| Acid arsenite (·2 per cent. $As_2O_3$) .. .. | 33 |
| Neutral arsenite (·2 per cent. $As_2O_3$) .. .. | 33 |
| Acid arsenite + ·2 per cent. oleic soap .. .. | 42 |
| Neutral arsenite + ·2 per cent. oleic soap .. | 39 |
| Acid arsenite + ·2 per cent. resin soap .. | 52 |
| Neutral arsenite + ·2 per cent. resin soap .. | 54 |
| Acid arsenite + ·2 per cent. bone-oil soap .. | 48 |
| Neutral arsenite + ·1 per cent. tar soap .. | 49 |
| Acid arsenite + ·2 per cent. bone-oil soap .. | 46 |
| Neutral arsenite + ·2 per cent. bone-oil soap .. | 48 |

Comparison of the figures obtained with those in Table 2 show, as would be expected, marked diminution of wetting power in compounding dip solutions containing fatty acid soaps with hard water. Nor does the increased alkali in the proportion employed serve to protect the soaps against the precipitating effect of calcium and magnesium salts. The effect on resin soaps and bone-oil soaps is less pronounced. On the other hand Stockholm tar solution would seem to retain the emulsifying power unaffected by hard water, and Stockholm tar is on this account a valuable ingredient in dipping fluids in preserving their wetting power when hard water is used.

A further important function of such substances as tar and bone-oil is the imparting of a distinct disagreeable odour and taste to dipping fluids, in order to minimise the risk of cattle drinking the fluid during immersion, as the salty taste of pure arsenite solution is often an inducement to cattle to drink such fluid.

It is also probable that certain materials added to the fluid may prevent reinfestation, and for this reason experiments with bone-oil, as stated, as a substitute for both Stockholm tar and tallow, are being carried out.

## THE OXIDATION OF ARSENITES.

One of the factors iuflnencing the efficacy of a dipping fluid is the possible deterioration by an oxidation of the arsenious acid into arsenic acid, or rather from arsenite into arsenate.

That alkaline solutions of arsenious acid tend to undergo oxidation in the atmosphere is generally recognised, and is a familiar fact to all whose experience it has been to keep solutions of ascertained strength over a period of time under laboratory conditions.

The importance of this phenomenon in dipping practice is evident from the fact that solutions of arsenates (the oxidised form) are considerably less effective in tick destruction as now generally recognised by all engaged in the work of tick eradication. The actual tick-killing property of sodium arsenate may be considered as a little less than one-half that of sodium arsenite, whereas the constitutional effect on cattle is practically the same or only slightly less. Numerous experiments carried out by Cooper and Laws have proved these facts (4 and 6.)

Brünnich first attributed inefficacy of certain arsenical dipping fluids to such deterioration (5) caused by the oxidation of arsenious acid, and also found that such oxidation was markedly increased in presence of tar and phenolic bodies.

A similar observation was made by Cooper and Freak (2), who further ascribe a promoting influence to action of light or increased temperature.

The extent to which such deterioration takes place in dips, in continuous use, has been remarkably constant, as we found 76·8 per cent., 71·0 per cent., 76·6 per cent. of all the fluids analysed in the years 1913-14, 1912-13, and 1911-12 respectively free from oxidation, and only 9·3 per cent., 9·2 per cent., and 12·2 per cent. respectively with 3 lb. and more of arsenic in the form of arsenate.

Our experiences further show that there is no marked difference in the rate of oxidation in the various recognised dipping mixtures, so that at present no manufacturer of concentrates could claim a superiority of his preparation over others in this respect. Furthermore, the claim made by Laws (6) that frequent use of a dip prevents oxidation is not borne out by our practical experience, as we found cases of rapid deterioration both in dips in constant heavy use and in others lying idle. Any deterioration in dips frequently refilled, or rather kept filled to a constant level, is largely obscured by the continual introduction of fresh dipping fluid.

Only chemical tests will be a safe guide to ensure proper concentration of a dipping fluid, as practical observation of the effects of fluids on ticks are only of value when made by trained observers, as the layman is quite satisfied with the efficacy of his dip if the majority of ticks are killed, and in many cases such practical tests would be of no value as being too late, particularly when cattle has to be travelled into clean country.

That organisms may play a part in the oxidation of arsenious acid was first indicated by Fuller (7), and recent publications in South

Africa (6 and 8) would seem to attribute the oxidation entirely to this cause.

The present work was undertaken with the view of ascertaining the relative effect of what we regard as a catalytic influence of tar and of bacterial action, and for the purpose of more closely studying each. The observations were made upon two series of solutions:—(1) Practically pure arsenite; (2) an arsenite solution containing tar and soap, and approximating to the Queensland Government formula of dipping fluids in general use.

The solutions to which a small amount of nutritive material was added were submitted to autoclave sterilisation in bottles plugged with cotton wool, and were left sterile or were inoculated with various media, allowed to stand for some weeks under varying conditions of illumination, when the extent of change of arsenite into arsenate was investigated.

The inhibitive effect of bactericides, mercuric cyanide, and formalin, upon activity of organisms was also investigated.

SERIES I.—PURE ARSENITE SOLUTIONS.

| No. | Time. | Light. | Treatment. | Per cent. of $As_2O_3$ Oxidised. |
|---|---|---|---|---|
| 1 | 6 weeks | Direct sun .. | Sterile .. .. .. .. .. | 11·0 |
| 2 | 6 weeks | Direct sun .. | Sterile .. .. .. .. .. | 8·7 |
| 3 | 6 weeks | Diffused light | Sterile .. .. .. .. .. | Nil |
| 4 | 6 weeks | Dark .. | Sterile .. .. .. .. .. | Nil |
| 5 | 6 weeks | Dark .. | Sterile .. .. .. .. .. | Nil |
| 6 | 6 weeks | Dark .. | Sterile .. .. .. .. .. | 2·7 |
| 7 | 12 weeks | Diffused light | Sterile .. .. .. .. .. | Nil |
| 8 | 6 weeks | Direct sun .. | Inoculated with oxidised dipping fluid (A) | 61·4 |
| 9 | 6 weeks | Direct sun .. | Inoculated with oxidised dipping fluid (A) | 64·7 |
| 10 | 6 weeks | Dark .. | Inoculated with oxidised dipping fluid (A) | 67·0 |
| 11 | 6 weeks | Dark .. | Inoculated with oxidised dipping fluid (A) | 66·0 |
| 12 | 6 weeks | Diffused .. | Inoculated with oxidised dipping fluid (B) | 100·0 |
| 13 | 6 weeks | Dark .. | Inoculated with oxidised dipping fluid (B) | 100·0 |
| 14 | 12 weeks | Diffused .. | Inoculated with oxidised dipping fluid (B) | 99·7 |
| 15 | 12 weeks | Diffused .. | Inoculated with oxidised dipping fluid (C) | 33·0 |
| 16 | 6 weeks | Direct sun .. | Inoculated with dipping fluid (A) 1:1000 mercuric cyanide | 16·1 |
| 17 | 6 weeks | Direct sun .. | Inoculated with dipping fluid (A) 1:10000 mercuric cyanide | 15·5 |
| 18 | 6 weeks | Dark .. | Inoculated with dipping fluid (A) 1:1000 mercuric cyanide | 1·0 |
| 19 | 6 weeks | Dark .. | Inoculated with dipping fluid (A) 1:10000 mercuric cyanide | ·9 |
| 20 | 6 weeks | Direct sun .. | Inoculated with dipping fluid (A) 1:1000 formalin | 9·5 |
| 21 | 6 weeks | Direct sun .. | Inoculated with dipping fluid (A) 1:2000 formalin | 9·6 |
| 22 | 6 weeks | Dark .. | Inoculated with dipping fluid (A) 1:1000 formalin | Nil |
| 23 | 6 weeks | Dark .. | Inoculated with dipping fluid (A) 1:2000 formalin | Nil |
| 24 | 12 weeks | Diffused .. | Inoculated with dipping fluid (C) without nutritive material | 2·1 |
| 25 | 12 weeks | Diffused .. | Inoculated with dipping fluid (C) without nutritive material | 1·7 |
| *26 | 12 weeks | Diffused .. | Without nutritive material, 1:1000 hycol. | 16·1 |
| *26A | 12 weeks | Diffused .. | Without nutritive material, 1:2000 hycol. | 11·1 |

* The effect of presence of phenolic body in inducing oxidation is here again demonstrated.

SERIES 2.—SOLUTIONS OF ARSENITE: TAR AND SOAP.

| No. | Time. | Light. | Treatment. | Per cent. of $As_2O_3$ Oxidized. |
|---|---|---|---|---|
| 27 | 6 weeks | Direct sun .. | Sterile .. .. .. .. .. | 29·4 |
| 28 | 6 weeks | Direct sun .. | Sterile .. .. .. .. .. | 25·8 |
| 29 | 6 weeks | Dark .. | Sterile .. .. .. .. .. | 15·3 |
| 29A | 6 weeks | Dark .. | Sterile .. .. .. .. .. | 5·8 |
| 30 | 6 weeks | Diffused .. | Sterile .. .. .. .. .. | 33·4 |
| 31 | 6 weeks | Diffused .. | Sterile .. .. .. .. .. | 20·9 |
| 32 | 6 weeks | Diffused .. | Sterile .. .. .. .. .. | 34·9 |
| 33 | 6 weeks | Direct sun .. | Inoculated with fluid (A) .. .. .. | 28·1 |
| 34 | 6 weeks | Direct sun .. | Inoculated with fluid (A) .. .. .. | 29·1 |
| 35 | 6 weeks | Dark .. | Inoculated with fluid (A) .. .. .. | 21·7 |
| 36 | 6 weeks | Dark .. | Inoculated with fluid (A) .. .. .. | 20·7 |
| 37 | 6 weeks | Dark .. | Inoculated with fluid (B) .. .. .. | 66·2 |
| 38 | 6 weeks | Direct sun .. | Inoculated with fluid (A) 1:1000 mercuric cyanide | 31·8 |
| 39 | 6 weeks | Direct sun .. | Inoculated with fluid (A) 1:10000 mercuric cyanide | 29·4 |
| 40 | 6 weeks | Direct sun .. | Inoculated with fluid (A) 1:1000 formalin | 29·7 |
| 41 | 6 weeks | Direct sun .. | Inoculated with fluid (A) 1:2000 formalin | 29·7 |
| 42 | 6 weeks | Dark .. | Inoculated with fluid (A) 1:1000 mercuric cyanide | 10·2 |
| 43 | 6 weeks | Dark .. | Inoculated with fluid (A) 1:10000 mercuric cyanide | 11·3 |
| 44 | 6 weeks | Dark .. | Inoculated with fluid (A) 1:1000 formalin | 4·7 |
| 45 | 6 weeks | Dark .. | Inoculated with fluid (A) 1:2000 formalin | 3·3 |

A series of experiments in which bacteria were introduced but no nutritive material, and in which oxidation was found to proceed to an equal extent to sterile solutions, indicated the dependence of the active organisms upon a liberal organic food supply; such however, must be always present in dipping solutions in actual use.

From the results summarised in the foregoing table it is possible to deduce the following facts:—

1. Pure arsenite solutions in darkness, or diffused light, under sterile conditions remain unoxidised (see Nos. 3, 4, 5, 6, and 7).

2. Pure sterile arsenite solutions exposed to direct sunlight undergo marked oxidation (see Nos. 1 and 2).

3. Sterile arsenite solutions undergo marked oxidation in the presence of tar in darkness; exposed to direct sunlight or diffused light the effect of tar is still more marked in inducing oxidation.

4. The oxidation of arsenious to arsenic acid can be effected by bacterial agency, the oxidising bacteria seeming to be equally active both in light and in darkness (see Nos. 8, 9, 10, 12, and 13).

5. There, however, appears to be a marked difference in the activity of strains of organisms introduced with various oxidised dipping fluids A, B, and C (see Nos. 10, 13, and 15).
6. Tar, apart from its effect in itself inducing oxidation, appears to exert an inhibitive effect on the activity of oxidising bacteria (compare Nos. 10 and 11 with 35 and 36, 13 and 37), and this inhibitive effect seems to be exerted to greater extent in sunlight, direct sunlight in tar solution almost completely preventing the activity of certain strains of organisms in Nos. 33 and 34 (compare with 27 and 28).
7. Bactericides as mercuric cyanide and formalin are effective in preventing growth of oxidising organisms, and bacterial activity is necessarily not evident except in presence of nutritive material (see Nos. 26 and 26A).

It would appear that the catalytic acceleration of tar and phenolic bodies is measurably greater under the higher temperatures of summer than during the winter months, though this point has not been thoroughly tested. We should also expect an optimum temperature for bacterial activity. The influence of tar, *per se*, and of organisms in bringing about the oxidation of arsenious acid is established, the former influence in promoting the oxidation being preponderant under solar influence, bacterial agency in exclusion of light. Which factor is predominant in dipping fluids under field conditions, it is impossible to say, as it must be borne in mind that fluids prepared for commercial concentrates contain generally considerably less tar than the Departmental fluid, and are likely to exhibit less bacterial inhibition due to that substance.

As already observed, it is a remarkable fact, however, that a large percentage of dipping fluids examined show no oxidation, or oxidation only to a small extent. It is evident, therefore, that there are agencies at work inhibiting the oxidation that occurs normally in arsenite solutions.

## THE BACTERIAL REDUCTION OF ARSENATES.

It has been suggested (6) that such apparent inhibition is due to the agency of organisms capable of reducing arsenic to arsenious acid. In order to test this point, sterile arsenate solutions, provided with nutritive material, and equivalent to ·2 per cent. strengths arsenic $As_2O_3$ were inoculated with various media likely to gain access to dipping fluids in dipping practice, and maintained under conditions of light and complete darkness, during periods of two and four weeks, when they were examined for arsenic in the reduced form of arsenite. The amounts found under the condition of the experiments are given below:—

SERIES 1.—PURE ARSENITE SOLUTION.

| No. | Time. | Light. | Treatment. | Per cent. $As_2O_3$ Reduced. |
|---|---|---|---|---|
| 1 | 4 weeks | Direct sun .. | Sterile .. .. .. .. .. | Nil |
| 2 | 2 weeks | Direct sun .. | Sterile .. .. .. .. .. | Nil |
| 3 | 4 weeks | Direct sun .. | Cowdung and urine .. .. .. .. | Nil |
| 4 | 2 weeks | Direct sun .. | Cowdung and urine .. .. .. .. | 9·5 |
| 5 | 4 weeks | Direct sun .. | Grass and hay .. .. .. .. | 3·4 |
| 6 | 2 weeks | Direct sun .. | Grass and hay .. .. .. .. | Nil |
| 7 | 4 weeks | Direct sun .. | Soil .. .. .. .. .. .. | Nil |
| 8 | 4 weeks | Direct sun .. | Washings from hide.. .. . .. | Nil |
| 9 | 2 weeks | Direct sun .. | Washings from hide.. .. .. .. | Nil |
| 10 | 4 weeks | Direct sun .. | Excrements, soil, and hide washings .. | Nil |
| 11 | 4 weeks | Dark .. | Sterile .. .. .. .. .. | Nil |
| 12 | 2 weeks | Dark .. | Sterile .. .. .. .. .. | Nil |
| 13 | 4 weeks | Dark .. | Cowdung and urine .. .. .. .. | 18·2 |
| 14 | 2 weeks | Dark .. | Cowdung and urine .. .. .. .. | 55·5 |
| 15 | 4 weeks | Dark .. | Soil and grass .. .. .. .. | Nil |
| 16 | 4 weeks | Dark .. | Washings from hide.. .. .. .. | 6·1 |
| 17 | 2 weeks | Dark .. | Washings from hide.. .. .. .. | 40·6 |
| 18 | 4 weeks | Dark .. | Unoxidised dipping fluid .. .. .. | Nil |
| 19 | 2 weeks | Dark .. | Unoxidised dipping fluid .. .. .. | Nil |

SERIES 2.—ARSENITE SOLUTION WITH TAR AND SOAP.

| No. | Time. | Light. | Treatment. | Per cent. $As_2O_3$ Reduced. |
|---|---|---|---|---|
| 20 | 4 weeks | Direct sun .. | Sterile .. .. .. .. .. | 1·0 |
| 21 | 4 weeks | Direct sun .. | Sterile .. .. .. .. .. | 1·3 |
| 22 | 4 weeks | Direct sun .. | Cowdung and urine .. .. .. .. | 6·6 |
| 23 | 4 weeks | Direct sun .. | Cowdung and urine .. .. .. .. | 22·6 |
| 24 | 4 weeks | Direct sun .. | Soil and grass .. .. .. .. | 10·9 |
| 25 | 4 weeks | Direct sun .. | Soil and grass .. .. .. .. | 17·2 |
| 26 | 4 weeks | Direct sun .. | Washings from hide .. .. .. .. | 9·1 |
| 27 | 4 weeks | Direct sun .. | Washings from hide .. .. .. .. | 2·5 |
| 28 | 4 weeks | Direct sun .. | Unoxidised dipping fluid .. .. .. | 7·6 |
| 29 | 4 weeks | Direct sun .. | Unoxidised dipping fluid .. .. .. | 5·1 |
| 30 | 4 weeks | Dark .. | Sterile .. .. .. .. .. | 1·5 |
| 31 | 4 weeks | Dark .. | Sterile .. .. .. .. .. | 2·5 |
| 32 | 4 weeks | Dark .. | Cowdung and urine .. .. .. .. | 35·6 |
| 33 | 4 weeks | Dark .. | Cowdung and urine .. .. .. .. | 40·5 |
| 34 | 4 weeks | Dark .. | Soil and grass .. .. .. .. | 16·8 |
| 35 | 4 weeks | Dark .. | Soil and grass .. .. .. .. | 10·1 |
| 36 | 4 weeks | Dark .. | Washings from hide .. .. .. .. | 2·5 |
| 37 | 4 weeks | Dark .. | Washings from hide .. .. .. .. | 9·1 |
| 38 | 4 weeks | Dark .. | Unoxidised dipping fluid .. .. .. | 7·6 |
| 39 | 4 weeks | Dark .. | Unoxidised dipping fluid .. .. .. | 5·1 |

The figures are sufficient to prove the bacterial reduction of arsenate solutions. The inconsistency of duplicate experiments with the same inoculating medium would be accounted for by the difficulty of insuring uniform inoculation, but the general significance of the results is not thereby invalidated, and is all the more evident in view of the fact that the introduced media may also contain organisms capable of affecting the oxidation of arsenite.

It is observed that in pure solutions in the majority of cases reduction does not occur—here it is assumed that oxidising bacteria are in

the ascendency—but in tar solutions, especially in those removed from light, marked reduction has taken place.

We are able to tentatively suggest that the presence of tar has not the inhibitive effect upon reducing bacteria that the previous experiments indicate it exerts upon oxidising organisms, and that the exclusion of light is specially conducive to their activity, a condition the oxidising bacteria are independent of.

Absolute uniformity in the results of experiments such as described, however, cannot be expected in view of the fact that in each inoculation different strains or classes of organisms are introduced, that may show varying preference with regard to environment.

The maintenance of the arsenite concentration of dipping fluids would seem to rest mainly on the growth and activity of organisms capable of preserving it in opposition to the oxidising influence of tar, light, and the opposing oxidising organisms, and the determination of the environmental conditions most conducive to their multiplication presents the most promising field for further investigation.

With regard to future work along these lines the advisability of dealing with pure cultures is urged.

The probable intolerance of the reducing organisms to concentrations of mercuric cyanide and formalin found efficacious in inhibiting the activity of oxidising bacteria renders their recommendation for use at this stage doubtful.

At present our recommendations for the cleaning out of dips, which show persistent rapid oxidation of their fluid content, before recharging them with fresh fluid, are the following:—

Empty out all fluid, clean out thoroughly, spray walls, woodwork, and also dripping yards with formalin solution, whitewash dip and timber, and allow at least a week interval before recharging.

This treatment was suggested by the probability of destroying local unfavourable strains of bacteria, and permitting the establishment of more favourable conditions, and such treatment has already been found successful in a few cases.

In concluding, we must express our thanks to the officers of the Stock Experiment Station, the Government Veterinary Officers (Messrs. Cory and O'Gorman), and Stock Inspector Carmody, in aiding in some of the observations and carrying out of experiments.

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(7) A. V. Fuller: Spontaneous Oxidation of Arsenical Dipping Fluids. *United States Department of Agriculture*, Circular 182.

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## TIMES OF SUNRISE AND SUNSET AT BRISBANE—1914.

| Date. | May. | | June. | | July. | | August. | |
|---|---|---|---|---|---|---|---|---|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. |
| 1 | 6·13 | 5·17 | 6·30 | 5·0 | 6·39 | 5·3 | 6·30 | 5·18 |
| 2 | 6·14 | 5·16 | 6·30 | 5·0 | 6·39 | 5·4 | 6·30 | 5·18 |
| 3 | 6·14 | 5·15 | 6·31 | 5·0 | 6·39 | 5·4 | 6·29 | 5·19 |
| 4 | 6·15 | 5·14 | 6·31 | 5·0 | 6·39 | 5·4 | 6·28 | 5·19 |
| 5 | 6·15 | 5·13 | 6·32 | 5·0 | 6·39 | 5·5 | 6·28 | 5·20 |
| 6 | 6·16 | 5·13 | 6·32 | 5·0 | 6·39 | 5·5 | 6·27 | 5·21 |
| 7 | 6·16 | 5·12 | 6·33 | 5·0 | 6·39 | 5·6 | 6·26 | 5·21 |
| 8 | 6·17 | 5·11 | 6·33 | 5·0 | 6·39 | 5·6 | 6·26 | 5·22 |
| 9 | 6·17 | 5·11 | 6·34 | 5·0 | 6·39 | 5·6 | 6·25 | 5·22 |
| 10 | 6·18 | 5·10 | 6·34 | 4·59 | 6·39 | 5·7 | 6·24 | 5·23 |
| 11 | 6·19 | 5·9 | 6·34 | 4·59 | 6·39 | 5·7 | 6·23 | 5·23 |
| 12 | 6·19 | 5·9 | 6·35 | 4·59 | 6·39 | 5·8 | 6·22 | 5·24 |
| 13 | 6·20 | 5·8 | 6·35 | 4·59 | 6·38 | 5·8 | 6·22 | 5·24 |
| 14 | 6·20 | 5·8 | 6·36 | 4·59 | 6·38 | 5·9 | 6·21 | 5·25 |
| 15 | 6·21 | 5·7 | 6·36 | 4·59 | 6·38 | 5·9 | 6·20 | 5·25 |
| 16 | 6·21 | 5·6 | 6·36 | 5·0 | 6·38 | 5·10 | 6·19 | 5·26 |
| 17 | 6·22 | 5·6 | 6·37 | 5·0 | 6·37 | 5·10 | 6·18 | 5·26 |
| 18 | 6·23 | 5·5 | 6·37 | 5·0 | 6·37 | 5·11 | 6·17 | 5·27 |
| 19 | 6·23 | 5·5 | 6·37 | 5·0 | 6·37 | 5·11 | 6·16 | 5·27 |
| 20 | 6·24 | 5·4 | 6·37 | 5·0 | 6·36 | 5·12 | 6·15 | 5·28 |
| 21 | 6·24 | 5·4 | 6·38 | 5·0 | 6·36 | 5·12 | 6·14 | 5·28 |
| 22 | 6·25 | 5·3 | 6·38 | 5·1 | 6·36 | 5·13 | 6·14 | 5·29 |
| 23 | 6·25 | 5·3 | 6·38 | 5·1 | 6·35 | 5·13 | 6·13 | 5·29 |
| 24 | 6·26 | 5·3 | 6·38 | 5·1 | 6·35 | 5·14 | 6·12 | 5·30 |
| 25 | 6·26 | 5·2 | 6·39 | 5·1 | 6·34 | 5·14 | 6·11 | 5·30 |
| 26 | 6·27 | 5·2 | 6·39 | 5·2 | 6·34 | 5·15 | 6·10 | 5·31 |
| 27 | 6·27 | 5·2 | 6·39 | 5·2 | 6·33 | 5·15 | 6·9 | 5·31 |
| 28 | 6·28 | 5·1 | 6·39 | 5·2 | 6·33 | 5·16 | 6·8 | 5·31 |
| 29 | 6·28 | 5·1 | 6·39 | 5·2 | 6·32 | 5·16 | 6·7 | 5·32 |
| 30 | 6·29 | 5·1 | 6·39 | 5·3 | 6·32 | 5·17 | 6·5 | 5·32 |
| 31 | 6·29 | 5·0 | ... | ... | 6·31 | 5·17 | 6·4 | 5·33 |

PHASES OF THE MOON.

| | | | H. | M. | |
|---|---|---|---|---|---|
| 3 May | ☾ | First Quarter | 4 | 29 | p.m. |
| 10 „ | ○ | Full Moon | 7 | 31 | a.m. |
| 17 „ | ☽ | Last Quarter | 8 | 12 | „ |
| 25 „ | ● | New Moon | 12 | 35 | p.m. |
| 2 June | ☾ | First Quarter | 12 | 3 | a.m. |
| 8 „ | ○ | Full Moon | 3 | 18 | p.m. |
| 16 „ | ☽ | Last Quarter | 12 | 20 | a.m. |
| 24 „ | ● | New Moon | 1 | 33 | „ |
| 1 July | ☾ | First Quarter | 5 | 24 | a.m. |
| 8 „ | ○ | Full Moon | 12 | 0 | „ |
| 15 „ | ☽ | Last Quarter | 5 | 32 | p.m. |
| 23 „ | ● | New Moon | 12 | 38 | „ |
| 30 „ | ☾ | First Quarter | 9 | 51 | a.m. |
| 6 Aug. | ○ | Full Moon | 10 | 41 | a.m. |
| 14 „ | ☽ | Last Quarter | 10 | 56 | „ |
| 21 „ | ● | New Moon | 10 | 26 | p.m. |
| 28 „ | ☾ | First Quarter | 2 | 52 | „ |

# General Notes.

## TO SOFTEN A HARD SPONGE.

"Town and Country" gives three receipes for softening a sponge:—1. Soak it in cold buttermilk for a few hours, then wash it in clean water. 2. Take one quart of rainwater, make it quite hot, then add a teaspoonful of soda and a little soap. Lay in the sponge for ten minutes, then it will be ready for use. 3. Place the sponge in a saucepan with cold water and a spoonful of borax. Let it come to the boil, then take out, and rub with a little borax.

## BANANA MANURING AT BUDERIM STATE SCHOOL.

The head teacher of the above school (Mr. R. G. Bartlett) points out that an error crept into his report on banana manuring at the school as published in the June issue of this Journal. The report should have been headed "Return of Results from 1st March, 1913," [not 1912] "to 28th February, 1914." As the returns are only for twelve months, this error detracts from the value of the report as published. We willingly make the correction, merely remarking that we published the report exactly as we received it from the Department of Public Instruction.

## PARTICULARS OF WHERE AGRICULTURAL LIME CAN BE OBTAINED IN QUEENSLAND.

From time to time application is made to the Department of Agriculture as to the sources whence lime for agricultural purposes can be procured. There are several vendors of this article in various parts of the State, as, for instance, at Bundaberg, Townsville, Cairns, Mackay, Hinchinbrook Island, Chillagoe, Sweer's Island, Rockhampton Cawarral, Marmor in the North, and Mount Larcom district in the Burnett district.

Prices vary according to the class of lime required, and the mode of preparation for transport, whether in bags, tanks, or in bulk, from 9s. per ton for crude ore, 10s. per ton for screenings, 15s. for carbonate, 30s. for coral sand (Cairns), 40s. for coarsely ground lime shells (Hinchinbrook) to 60s. per ton (Rockhampton). The prices quoted are on the rails at the station of departure or at the port.

The whole subject of the use of lime in Agriculture was dealt with by Mr. J. C. Brünnich, Agricultural Chemist, in an article in the May (1914) issue of the "Queensland Agricultural Journal," to which was appended a table of analyses of the limestones, shells, sand, and corals of the districts above mentioned.

The names of the firms dealing with this material can, of course, always be ascertained by application to the various Shire Councils, local merchants, or the local Press.

Particulars may also be obtained from Messrs. F. R. Brand, Bundaberg; Douglas Pitt, Cairns; H. A. Ryan, Calcium Siding, Townsville; David Donald, Townsville; E. Garner, Clump Point, Innisfail; G. W. Tremble, Mackay; A. Diehm, Hinchinbrook Island; Chillagoe, Limited; Mount Morgan G.M. Co.; W. Breckels and Co., Rockhampton; H. Tooker and Sons, Cawarral; J. de Raeve, Mount Etna Caves, Rockhampton.

## RAILWAY RATES FOR THE CONVEYANCE OF LIMESTONE SCREENINGS FOR MANURING PURPOSES.

The following rates are in existence from Marmor:—

| —— | Miles. | Special Rate per Ton. | | Classification Rate, "M" Class, per Ton. | |
|---|---|---|---|---|---|
| | | s. | d. | s. | d. |
| Bingera | 162 | 10 | 6 | 12 | 8 |
| Bullyard | 172 | 10 | 6 | 13 | 3 |
| Maroondan | 176 | 11 | 0 | 13 | 6 |
| Childers | 191 | 11 | 0 | 14 | 6 |
| Huxley | 193 | 11 | 0 | 14 | 7 |
| Gillen's Siding | 196 | 11 | 0 | 14 | 9 |
| 48-Mile | 200 | 11 | 0 | 15 | 0 |
| Boolboonda | 208 | 11 | 6 | 15 | 4 |
| Mt. Perry | 218 | 11 | 6 | 15 | 9 |
| North Arm | 298 | 15 | 0 | 19 | 1 |
| Yandina | 301 | 15 | 0 | 19 | 3 |
| Woodford | 357 | 16 | 0 | 21 | 7 |
| Kuraby | 388 | 20 | 0 | 22 | 10 |
| Stapylton | 403 | 20 | 0 | 23 | 6 |

## NEW HYBRID ORANGE.

We have received from Mr. James Collins, of Redland Bay, some very fine samples of a Mandarin Orange which is a hybrid produced by crossing the Beauty of Glen Retreat with the Washington Navel Orange. Judging by the fruit, the experiment has proved eminently successful. Mr. Collins also sent us specimens of a choice, chance seedling orange which originated on the Kolan River. Both varieties, he said, are extremely prolific, the trees very robust, and the specimens are a really fine sample of fruit. Both were photographed by Mr. Mobsby, of this Department, but too late for illustration in this issue of the Journal.

## AN EFFICIENT METHOD OF POISONING FLYING FOXES.

The "Agricultural Gazette" of New South Wales (June) publishes the following method of getting rid of flying foxes, supplied to the Department of Agriculture of that State by Mr. John H. Greensell, of Mulwaree Gardens, Goulburn. He says:—

"I may say that the flying foxes have been worse this season than ever I have known before, dating back over thirty years.

"As the nights were so dark it was impossible to shoot them, so I had to resort to the poisoning. My crops of apples and pears were very heavy, and the foxes were doing an immense amount of damage.

"The method I adopted was to run a thin wire through the core of an apple, then slice off one side and sprinkle it with strychnine. It was then fastened to the highest branch of a tree.

"The first night I placed 12 poisoned apples in 8 pear-trees and 4 apple-trees, and destroyed 66 foxes. The second night 16 baits were

hung out, and 74 foxes secured. The third night's total was 64, the fourth 36, and the fifth 30, making a total for the five nights of 270. Since the fifth night of poisoning I have only seen an odd fox. There were as many as 8 foxes hanging round one bait.

"I am more than satisfied with the results, and recommend any growers who are plagued with the pests to try the method for themselves."

### TO ESTIMATE STANDING CROPS.

The following table (taken from the "Farm Bulletin" for May) gives a formula for measuring roughly the amount of wheat to the acre should it be desired to ascertain before harvesting.

To use the table, make a square frame of wood or iron measuring 1 yard each way. Let it down carefully over an average patch of standing grain, and then shell and weigh the grain carried by the straws enclosed:—

| | | | | | |
|---|---|---|---|---|---|
| 2 | oz. grain | per square yard | 10 | bushels | per acre. |
| 2½ | oz. | " " | 12½ | " | " |
| 3 | oz. | " " | 15 | " | " |
| 3½ | oz. | " " | 17½ | " | " |
| 4 | oz. | " " | 20 | " | " |
| 5 | oz. | " " | 25 | " | " |
| 6 | oz. | " " | 30 | " | " |
| 7 | oz. | " " | 35 | " | " |
| 8 | oz. | " " | 40 | " | " |

# Answers to Correspondents.

### DESTROYING TREE SUCKERS.

"COO-EE," Cooyar—

See Journals for May and April, 1914; also see Notice to Correspondents on page VIII. of the current issue.

### MUSTARD AND CRESS.

"SALADS," North Queensland.

The above two excellent salad vegetables are, as you say, never seen in the greengrocers' shops, nor have we seen it either in market gardens or in private gardens, yet there is no nicer small salad cut fresh from the garden for breakfast or for sandwiches. Both grow as easily as weeds, and are annuals. Any good garden loam suits them; but, to ensure rapid growth and the production of crisp, tender leaves, the soil should be very fertile. With favourable conditions the leaves will be large enough to use in four weeks from sowing. Sow in shallow drills about 6 in. apart thickly. The plants require abundant moisture and shade. If there is no shade in the garden, cover them over with boughs so as to draw the plants and make them crisp. Mustard can be sown with cress, but two weeks later. Preferably they should be sown separately. Gather the leaves as wanted, and allow another crop to develop. We have both kinds growing, and when cut several more crops have come on. Cut when 3 in. high. Cress is a spring and autumn crop, and does not thrive in midsummer.

# The Markets.

## PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JUNE, 1914.

| Article. | | JUNE. Prices. |
|---|---|---|
| Bacon | lb. | 8d. to 10½d. |
| Bran | ton | £5 5s. |
| Butter | cwt. | 102s. to 104s. (locally, 112s.) |
| Chaff, Mixed | ton | £4 to £4 15s. |
| Chaff, Oaten (Victorian) | ,, | £4 to £4 15s. |
| Chaff, Lucerne | ,, | £3 10s. to £6 6s. |
| Chaff, Wheaten | ,, | £3 5s. |
| Cheese | lb. | 8¾d. |
| Flour | ton | £9 |
| Hams | lb. | 1s. 2d. |
| Hay, Oaten (Victorian) | ton | £5 to £5 5s. |
| Hay, Lucerne (Prime) | ,, | £3 to £3 15s. |
| Honey | lb. | 2d. to 2½d. |
| Maize | bush. | 3s. 3½d. to 3s. 5d. |
| Oats | ,, | 3s. 6d. to 3s. 8d. |
| Onions | ton | £8 to £9 |
| Peanuts | lb. | 2½d. to 2¾d. |
| Pollard | ton | £5 5s. |
| Potatoes | ,, | £3 to £6 |
| Potatoes (Sweet) | cwt. | 1s. 6d. to 2s. 5d. |
| Pumpkins | ton | £1 15s. to £2 |
| Wheat, Milling | bush. | 3s. 4d. to 3s. 7d. |
| Eggs | doz. | 1s. 8d. to 2s. |
| Fowls | pair | 3s. to 3s. 6d. |
| Geese | ,, | 5s. 6d. to 5s. 9d. |
| Ducks, English | ,, | 3s. 9d. to 4s. |
| Ducks, Muscovy | ,, | 4s. to 6s. 6d. |
| Turkeys (Hens) | ,, | 8s. to 9s. |
| Turkeys (Gobblers) | ,, | 10s. to 14s. 9d. |

## SOUTHERN FRUIT MARKETS.

| Article. | JUNE. Prices. |
|---|---|
| Bananas, G.M., per case | 18s. 6d. to 19s. |
| Bananas, G.M., per bunch | 4s. 6d. to 12s. |
| Bananas (Fiji), per case | 15s. 6d. to 18s. |
| Bananas (Fiji), per bunch | 3s. 6d. to 10s. |
| Custard Apples, per case | 6s. to 9s. |
| Lemons, per case | 6s. to 8s. |
| Mandarins (Queensland), per case | 8s. to 10s. |
| Oranges (Navel), per case | 12s. |
| Oranges (other), per case | 6s. to 8s. |
| Papaw Apples, per quarter-case | 4s. to 5s. |
| Passion Fruit, per half-case | 2s. 6d. to 10s. |
| Pineapples (Queensland), (Queens), per case | 7s. to 9s. |
| Pineapples (Ripleys), (cutting black), per case | ... |
| Pineapples (commons), per case | 5s. to 6s. |
| Strawberries | ... |
| Tomatoes, per quarter-case | 4s. to 5s. |

## PRICES OF FRUIT—TURBOT STREET MARKETS.

| Article. | JUNE. Prices. |
|---|---|
| Apples, Eating (Tasmanian), per case | 7s. to 10s. |
| Apples, Eating (Local), per case | ... |
| Apples (Cooking), per case | 7s. to 9s. |
| Bananas (Cavendish), per dozen | 3d. to 3½d. |
| Bananas (Sugar), per dozen | 1½d. to 2½d. |
| Cape Gooseberries, per quarter-case | 7s. to 10s. |
| Cocoanuts, per sack | 12s. to 14s. |
| Cumquats, per case | 2s. 6d. to 3s. |
| Custard Apples, per quarter-case | 2s. 6d. to 4s. 6d. |
| Lemons (Local), per case | 4s. 6d. to 6s. 6d. |
| Mandarins, per case | 5s. to 9s. |
| Oranges (Navel), per case | 8s. |
| Oranges (other), per case | 3s. 6d. to 6s. 6d. |
| Papaw Apples, per quarter-case | 1s. 6d. to 2s. 6d. |
| Passion Fruit, per quarter-case | 3s. 10d. to 4s. 6d. |
| Peanuts, per pound | 2½d. to 2¾d. |
| Pineapples (Ripley), per dozen | 1s. to 2s. 3d. |
| Pineapples (Rough), per dozen | 1s. to 2s. |
| Pineapples (Smooth), per dozen | 1s 9d. to 3s. 6d. |
| Rosellas, per sugar bag | 3s. 6d. to 5s. 1d. |
| Strawberries, per dozen pint boxes | 7s. 6d. to 12s. 9d. |
| Strawberries, per tray | 2s. 6d. to 3s. |
| Tomatoes, per quarter-case | 2s. 6d. to 6s. |

## TOP PRICES, ENOGGERA YARDS, MAY, 1914.

| Animal. | MAY. Prices. |
|---|---|
| Bullocks | £9 2s. 6d. to £11 |
| Cows | £6 10s. to £8 15s. |
| Merino Wethers | 29s. |
| Lincoln Wethers | 28s. 9d. |
| Crossbred Wethers | 26s. 6d. |
| Merino Ewes | 22s. 6d. |
| Lincoln Ewes | 21s. 9d. |
| Crossbred Ewes | 25s. 3d. |
| Lambs | 24s. |
| Pigs (Porkers) | 39s. |

## THE SISAL HEMP MARKET.

Messrs. Landaner and Co., London, in their weekly report for 29th April, state that, admittedly, this commodity (sisal hemp) holds the key of the situation of the whole of the fibre markets. At the moment no offers or quotations can be obtained either from Yucatan or New York, and a total stoppage of supplies is threatened. A sharp rise in German East African sisal has taken place in sympathy with Manila and the uncertain outlook for Mexican sisal. Prices paid record an advance of £3 per ton, and sales have been made of No. 1 quality at £31 to £31 10s. per ton.

Mauritius hemp (Furcræa) has also risen to £25 per ton for good, fair, prime quality being unattainable.

# Farm and Garden Notes for August.

This and the following two months are about the busiest periods of the year so far as work in the field is concerned; and the more activity now displayed in getting in the summer crops, the richer will be the reward at harvest time. Potatoes should be planted, taking care to select only good sound seed that has sprouted. This will ensure an even crop. Yams, arrowroot, ginger, sisal hemp, cotton, and sugar-cane may now be planted. Sow maize for an early crop. If the seed of prolific varieties is regularly saved, in the end it will not be surprising to find from four to six cobs on each stalk. This has been the experience in America, where the selecting of seeds has been reduced to a fine art.

In choosing maize for seed, select the large, well-filled, flat grains. It has been shown that, by constantly selecting seed from prolific plants, as many as five and six cobs of maize can be produced on each stalk all over a field. A change of seed from another district is also beneficial. Sow pumpkins, either amongst the maize or separately, if you have the ground to spare. Swede turnips, clover, and lucerne may be sown, but they will have to contend with weeds, which will begin to vigorously assert themselves as the weather gets warmer; therefore keep the hoe and cultivator constantly going in fine weather. Tobacco may be sown during this month. If vines are available, sweet potatoes may be planted towards the end of the month. In this case also it is advisable to avoid too frequent planting of cuttings from the old vines, and to obtain cuttings from other districts. If grasses have not yet been sown, there is still time to do so, if the work be taken in hand at once. Sugar-cane crushing will now be in full swing, and all frosted cane in the Southern district should be put through the rollers first. Plough out old canes, and get the land in order for replanting. Worn out sugar lands in the Central and Northern districts if not intended to be manured and replanted will bear excellent crops of sisal hemp. Rice and coffee should already have been harvested in the North. The picking of Liberian coffee, however, only begins this month. Collect divi-divi pods. Orange-trees will be in blossom, and coffee-trees in bloom for the second time. As this is generally a dry month in the North, little can be done in the way of planting.

KITCHEN GARDEN.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown which will keep the market gardeners busy for some time: Carrots, parsnip, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie in

the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top dressing, where vegetables have been planted out, with fine stable manure has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

FLOWER GARDEN.—All the roses should have been pruned some time ago, but do not forget to look over them occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragon), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall 2·63 in., and for September 2·07 in., increasing gradually to a rainfall of 7·69 in. in February.

# Orchard Notes for August.

## THE SOUTHERN COAST DISTRICTS.

The remarks that have appeared in these notes during the last few months respecting the handling and marketing of Citrus Fruits apply equally to the present month. The bulk of the fruit, with the exception of the latest ripening varieties in the latest districts, is now fully ripe, and should be marketed as soon as possible, so that the orchards can be got into thorough order for the Spring growth. All heavy pruning should be completed previous to the rise in the sap; and where Winter spraying is required, and has not yet been carried out, no time should be lost in giving the trunks, main branches, and inside of the trees generally a thorough dressing with the lime and sulphur wash.

Where there are inferior sorts of seedling citrus trees growing, it is advisable to head same hard back, leaving only the main trunk and four or five well balanced main branches cut off at about 2 ft. from the trunk. When cut back give a good dressing with the lime and sulphur wash. Trees so treated may either be grafted with good varieties towards the end of the month or early in September; or, if wished, they may be allowed to throw out a number of shoots, which should be thinned out to form a well balanced head, and when large enough should be budded with the desired variety.

Grafting of young stock in nursery, not only citrus but most kinds of deciduous fruits, can be done this month. It comes in useful in the case of stocks that have missed in budding, but for good clean grown stocks I prefer budding.

In the case of working our Seville orange stocks to sweet oranges, grafting is, however, preferable to budding, as the latter method of propagation is frequently a failure. The Seville stock should be cut off at or a little below the surface of the ground. If of small size, a single tongue graft will be sufficient, but if of large size, then the best method is the side graft—two or more grafts being placed in each stock, so as to be certain of one taking. In either case the grafts are tied firmly in place, and the soil should be brought round the graft as high as the top bud. If this is done, there will be few missed, and undesirable Seville stocks can be converted into sweet oranges.

In selecting wood for grafting, take that of the last season's growth that has good full buds and that is well-matured—avoid extra strong, or any poor growths.

Seville oranges make good stocks for lemons. In case it is desirable to work them on to lemons, it is not necessary to graft below ground, as in the case of the sweet orange, but the stock can be treated in the same manner as that recommended in the case of inferior oranges—viz., to head hard back, and bud on the young shoots.

Where orchards have not already been so treated, they should now be ploughed so as to break up the crust that has been formed on the surface during the gathering of the crop, and to bury all weeds and trash. When ploughed, do not let the soil remain in a rough, lumpy condition, but get it into a fine tilth, so that it is in a good condition to retain moisture for the trees' use during Spring. This is a very important matter, as Spring is our most trying time, and the failure to conserve moisture then means a failure in the fruit crop, to a greater or lesser extent.

Where necessary, quickly-acting manures can be applied now. In the case of orchards, they should be distributed broadcast over the land, and be harrowed or cultivated in; but, in the case of pines, they should be placed on each side of the row, and be worked well into the soil.

The marketing of pines, especially smooths, will occupy growers' attention, and where it is proposed to extend the plantations the ground should be got ready, so as to have it in the best possible condition for planting, as I am satisfied that the thorough preparation of the land prior to planting pines is money very well spent.

The pruning of all grape vines should be completed, and new plantings can be made towards the end of the month. Obtain well-matured, healthy cuttings, and plant them in well and deeply worked land, leaving the top bud level with the surface of the ground, instead of leaving 6 or 7 in. of the cutting out of the ground to dry out, as is often done. You only want one strong shoot from your cutting, and from this one shoot you can make any shaped vine you want. Just as the buds of the vines

begin to swell, but before they burst, all varieties that are subject to black spot should be dressed with the sulphuric acid solution—viz., three-quarters of a pint of commercial sulphuric acid to one gallon of water; or, if preferred, this mixture can be used instead—viz., dissolve 5 lb. of sulphate of iron (pure copperas) in one gallon of water, and when dissolved add to it half a pint of sulphuric acid.

## THE TROPICAL COAST DISTRICTS.

Bananas should be increasing in quality and quantity during the month, and though, as a rule, the fruit fly is not very bad at this time of the year, still it is advisable to take every care to keep it in check. No over-ripe fruit should be allowed to lie about in the gardens, and every care should be taken to keep the pest in check when there are only a few to deal with, as, if this is done, it will reduce the numbers of the pest materially later on in the season. The Spring crop of oranges and mandarins will be now ready for marketing in the Cardwell, Tully, Cairns, and Port Douglas districts. For shipping South see that the fruit is thoroughly sweated, as unless the moisture is got rid of out of the skins the fruit will not carry. Should the skins be very full of moisture, then it will be advisable to lay the fruit on boards or slabs in the sun to dry; or, if this is not possible, then the skin of the fruit should be artificially dried by placing same in a hot chamber, as the moisture that is in the skin of our Northern-grown citrus fruits must be got rid of before they will carry properly.

Papaws and granadillas should be shipped South, and the markets tested. If carefully packed in cases holding only one layer of fruit, and sent by cold storage, these fruits should reach their destination in good order. Cucumber and tomato shipments will be in full swing from Bowen. Take care to send nothing but the best fruit, and don't pack the tomatoes in too big cases, as tomatoes always sell on their appearance and quality.

## SOUTHERN AND CENTRAL TABLELANDS.

All fruit-tree pruning should be finished during the month, and all trees should receive their winter spraying of the lime and sulphur wash.

All new planting should be completed, orchards should be ploughed and worked down fine, and everything got ready for Spring.

In the warmer parts, grape-pruning should be completed, and the vines should receive the Winter dressing for black spot. In the Stanthorpe district grape-pruning should be delayed as late as possible; so as to keep the vines back, as it is not early but late grapes that are wanted, and the later you can keep your vines back the better chance they have of escaping Spring frosts.

Towards the end of the month inferior varieties of apples, pears, plums, &c., should be worked out with more desirable kinds; side, tongue, or cleft grafting being used. In the case of peaches, almonds, or nectarines, I prefer to head back and work out by budding on the young growth.

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# Agriculture.

## THE STORY OF A BLIGHT-PROOF POTATO.

### HOW THE "NEW ERA" WAS RAISED.

The agricultural paper which recklessly helped to boom even a tithe of the novelties in the vegetable or fruit world which from time to time are introduced to the notice of the farming community would soon be a by-word in the mouth of practical farmers But on the other hand it is within the province—in fact, becomes the duty of the progressive journal, to draw attention to new varieties of promise, so that those growers desirous of practically proving the merits of such may be able to do so. A fruit or vegetable which may do well in one part of the country may be an absolute failure in another; in fact, both in the growing of varieties, as in manuring, the only certain method for a farmer to follow out is to test these things for himself.

Last month a man from the backblocks—he had never been in Auckland before—walked quietly into the "Farmer" office, carrying a good-sized handbag, and announced that he was the grower of the "New Era" potato—a, so far, blight-proof and frost-resistant variety, to which brief references have been made in this and other papers during the last twelve months. Like so many of those who spend their lives "way out back," and come in closer touch with Nature than do the city dwellers, Mr. J. G. Harris, of Raetihi, the raiser of the "New Era" is a quiet, retiring man, who shuns personal publicity. He is, however, a keen student and observer of the Great Dame, and like all those who have during a lengthy experience used their brains as well as their muscles in farming, realises how very limited our knowledge is, and what little

reason any of us have to be dogmatic or over-confident in expressing an opinion on the workings of Nature.

Whether the new potato will prove to be as blight proof and frost resistant in other parts of New Zealand, or in other countries, has yet to be ascertained. Mr. Harris does not guarantee these much-required qualities, but his straightforward account of the tests which the "New Era" has stood at Raetihi for six years, naturally makes one confident that it is a variety worth handling. With the exception of a few tubers sent to a leading English seed house, and an odd sample to the Agricultural Department, this is the first season in which the potato will be distributed. It might be well to mention here that Mr. Harris has for many years made potato growing a hobby, and has made a practice of testing a number of the new varieties as they came out, giving as much as 15s. per lb. for some of them. He is an enthusiastic plant breeder, and fully realised the enormous value of selection, whether applied to either the animal or vegetable world. With his ordinary field crop of potatoes, he only uses seed from specially selected plants, and by this means can always obtain a higher price for his main crops than do other farmers.

HISTORY OF THE NEW VARIETY.

Six years ago Mr. Harris had an acre and a-half in potatoes—two kinds, Eldorado and Northern Star. The crops were grown from his own selected seed, the latter being originally obtained from Messrs. Laird and Co., of Wanganui, and the former from Mr. Atkinson, of Fielding. That present-day curse of the potato grower—blight—came along, and swept the crop with the exception of one plant, which, with a very strong and upright habit of growth, was untouched. Mr. Harris's attention was naturally drawn to this plant, and he carefully kept the six rather ugly-shaped tubers which it produced. Next season he planted these, but only two grew. They were planted out amongst a crop of two acres, but the season was a good one as no blight made its appearance, Mr. Harris was unable to gain any further knowledge as to the resistant qualities of the new arrival.

At the commencement of the third season there was much talk of the improved Up-to-Date potato, and Mr. Harris bought enough seed to plant half an acre. The forty to fifty tubers of the new variety, the product of the two roots mentioned, were planted out through the crop. The blight came, however, and totally destroyed the crop of Up-to-Dates; in fact, so severe were the effects of the blight that not a single root was dug, while the plants of the new variety were absolutely untouched although surrounded by the blight-stricken crop, and yielded at the rate of 10-12 tons to the acre.

In the fourth year the plantings of the "New Era" tubers, as Mr. Harris had named the new variety, were made right across a half-acre paddock with the main crop of Northern Stars planted down each side. It was not a good season and just before the Stars became ripe a severe frost was experienced which cut them down but did not touch the "New Eras," although planted in the same paddock and under exactly similar conditions. Mr. Harris's brother, who is a resident in the Manawatu,

happened to be staying the night with him, and after going outside the morning following the frost, came in and said, "Well, Jack, your potatoes are frost-proof as well as blight-proof."

Up to the fifth season Mr. Harris had said little about the new variety, for he wished to thoroughly test its powers of resistance to both frost and blight. During March there was a bad spell of muggy weather and blight again injured the crop of Northern Stars, but left the rows of "New Eras" uninjured, and Mr. Bayliss, the Fields Officer of the Agricultural Department, who visited Mr. Harris's farm during the autumn, pulled up dozens of roots without discovering a sign of blight, although the blighted leaves and haulms of the Northern Stars were falling on the "New Eras."

The present season, the sixth year, provided further evidence of the power of the new variety to resist blight. Mr. Harris had again two acres in potatoes, comprising such varieties as Northern Stars, Up-to-Dates, Irish Rocks, Eldorados, and a few Gamekeepers. Late in the season, in April, blight made its appearance and attacked all the varieties named except the "New Eras."

By the above it will be seen that the new variety was found six years ago and that for the following five years its blight and frost resistant qualities were tested in a very thorough manner, so that the owner is justified in placing it on the market. During the last twelve months numerous letters from all parts of the world have been received at the office of this paper relative to the new variety, and for the information of our readers we are glad to be able to place before them an authentic account of the production of this potato. The whole world is looking for a blight-proof potato, and the searching tests which the "New Era" has been subjected to by the raiser would make it appear that a certain measure of success at least has been obtained.

### YIELD AND QUALITY.

The "New Era" is a nicely shaped potato, bearing some resemblance in form to Eldorado. It grows on a strong, thick stalk, and is not inclined to sprout very freely.

This year on Mr. Harris's farm at Raetihi it yielded two bags to one of the Northern Star, and when picked before ripening has a remarkably clean skin, thus making it suitable to grow for the early potato trade. It appears also to be a good keeper. During the fourth year Mr. Harris sent nine sets to one of his brothers, who lives in a district 1,000 ft. lower that Raetihi, and here the potato gave equally good results, the nine sets yielding 56 lb. of eatable potatoes.

In conclusion, it might be well to issue a word of warning in regard to the reproduction of any new variety of potato, more particularly when its blight-resistant powers are its attraction. Every care should be taken not to sacrifice its "constitution"—if such a term can be used to a potato—to speedy reproduction. Several varieties of potatoes which came out to this country with a good character in regard to their blight-resistant qualities were speedily run out in the feverish efforts of the

introducers to reproduce them in the shortest possible time.—" New Zealand Farmer."

[It is stated that this potato has produced up to 20 tons per acre. An advertisement in the " New Zealand Farmer" gives the price of seed of the " New Era" as 7s. 6d. per lb.—Ed. "Q.A.J."]

## PRICKLY PEAR BURNERS.

The question of the destruction of prickly pear is one of vital importance both to the State and to the individual settler—pastoralist or agricultural selector. Many have been the suggestions for means of effectually dealing with this pest, which is annually making large encroachments on the finest grazing and agricultural lands on earth. Many schemes have been placed before the Government, but so far none have proved efficacious, or, if efficacious, they have involved too great expense for effecting the desired result. Mr. Roberts's experiments seem to be likely to come to fruition, and it is devoutly hoped that his process of destruction of the pear by enveloping it in a poisonous gas will prove not only a success as to the destruction of the pear, but also from a financial point of view.

We have now another enemy of the pear in the field, Mr. Dawson, who has been all through the pear country, and who proposes to completely destroy the plants by means of burning. This burning does not mean the reduction of the pear to ashes, resulting in the production of potash available for agricultural purposes, but it aims at completely destroying the prickles, and *pari passu,* the seeds in the ripe and unripe fruit, together with the roots, but leaving the scorched leaves in such a condition as to be readily eaten by stock.

It is, perhaps, not generally known, but we are authoritatively informed that, whilst the unripe fruit falling on the soil allows the seeds to germinate, the seed of the fully ripe fruit invariably fails to germinate. One pastoralist interested in the question offered, we are informed, £5 to anyone who could raise plants from the seed of a fully ripened fruit. This meant, of course, that the fruit must not first be swallowed by an emu or other prickly pear feeding animal. Like the Moreton Bay fig and many other plants, the seed does not freely germinate unless it has been in contact with the gastric juices of these animals' stomachs.

Now, to come to Mr. Dawson's scheme for the complete destruction of the pest by means of burning, we will, in general support of it, show what has been done in the same manner in the United States of America.

In 1905 the United States Department of Agriculture published a very interesting Bulletin (No. 74) of the Bureau of Plant Industry, by D. Griffiths, Assistant Agrostologist in Charge of Range Investigations.

In this Bulletin, Mr. Griffiths deals with pear burners. These were first manufactured in 1898. As now used they are essentially a modification of the plumber's torch. The two pear burners on the market are

very similar in construction, and are both efficient machines according to the best evidence it has been possible to obtain. They consist essentially of a strong, well-riveted metal tank, which, in actual use, is supported on the shoulders of the operator by a strap; a long delivery pipe, and a burner for generating and consuming gas from gasoline. The two machines differ only in minor mechanical contrivances and in the form of the burner. It has been found by experience that it is absolutely essential that the tank be strongly built in order to prevent accident. Several of the first burners used were too light in construction and caused serious accidents. It is said that one or two men were killed by the explosion of the tanks and the burning of the gasoline.

The distinguishing features of one of the pear burners on the market are the turning joints of the delivery pipe, and the simple coiled-pipe burner, which is covered with a sheet-iron cylinder to prevent escape of heat, to give direction to the flame, and to protect the burner in windy weather. The other style of burner differs from the one just described mainly in the burner, which is somewhat more complicated. Both machines require gasoline for their operation. Practically, no labour is necessary with the burners other than that of passing the blast flame from the torch over the surface of the joints momentarily. Indeed, it is not usually necessary to do this with over two-thirds of the plant, for there is commonly enough dead herbage at the base, and growing up through the pear plants, to assist in burning off at least one-half of the spines. Besides, the spines are commonly less numerous upon the old stems, and cattle experience but little difficulty in eating the remainder after the outer two to four joints have been freed of them. The process of singeing the joints with one of these machines is therefore not a laborious or expensive one. Indeed, it is by far the cheapest method yet devised for utilising the prickly pear. It has, however, one or two disadvantages which will be discussed later.

Cattle brought up in pear pastures do not have to be taught to eat pear. They take to the feed very naturally. After a day or two of feeding, the sound of the pear burners, or the sight of smoke when pear is burned with brush, brings the whole herd to the spot immediately, and they follow the operator closely all day long, grazing the pear to the ground—old woody stems and all—if the supply that the operator can furnish is short.

The above short résumé of the method of destruction of the pear plant in the States will show that the burning of the plant does not mean its total destruction, which Mr. Griffiths says "would be a calamity." But what is needed in Queensland, with the enormous area of rich land which would carry thousands of sheep or cattle overrun with the pear, is its absolute destruction, and that is what Mr. Roberts and Mr. Dawson propose to do. We do not require the pear for stock feed. Get rid of the pear, and its place will be taken by succulent grasses and herbs which have ever been the stand by of the big pastoralist and the grazing farmer. We sincerely trust that both those gentlemen will be successful in their undertaking.

As far as feeding stock on singed pear is concerned, Mr. Griffiths points out that no manner of feeding cactus yet devised, without greater care than the feeder is willing to bestow upon the work, does away entirely with the evil effect of the spines. Singeing with a torch or brush is the most effectual in this regard, if sufficient care is taken by the operator. In practice, however, very little attention is paid to the small spines, the effort being to burn off the distal three-fourths of the large ones, leaving most of the small ones for the stock to contend with. Indeed, there is a prejudice—whether well founded or not, it has been impossible to determine—against pear scorched to the extent necessary to insure the removal of all the small spines. It is claimed that cattle scour much worse upon pear which has been excessively scorched by either torch or brush flame.

Another objection urged is that torch-scorched pear invariably dies if the flame is kept upon it long enough to ensure the removal of all the spines. . . . Simply singeing off the larger spines does not check the growth of the plants at all, and all the singed plants not actually grazed down grow in the following season.

In conversation with Mr. Dawson, we learned that by his burning process, the plant, the roots, and the seed, are absolutely destroyed. In very heavy pear growing amongst timber, he claims to be able to drive the fire-blast with devastating effect to a distance of over 6 or 8 ft. into the densest growth. Thus, by working on the outside edges of the growth, he will be enabled to follow it up by complete destruction of pear amongst timber.

## CULTIVATION OF THE POTATO.

In view of the enthusiastic manner in which the generous offer of Mr. W. J. Brett, manager for Messrs. Denham Bros., to supply a certain quantity of seed potatoes to State schools for planting and growing exclusively by boys, has been taken up, we give, for the benefit of those who have, perhaps, not had the opportunity of studying the practical methods of potato culture, the following notes on the subject, by an officer of the Department of Agriculture and Stock:—

The best soil for successful potato-growing is one which shows the greatest content of potash as shown by chemical analysis of the tuber. Hence the well-known value of soil derived from granitic detritus. In such a soil there is abundance of potassium silicate, derived from the decomposing felspar, and slowly set free in other forms for the uses of the plant. Where ground has been annually cropped with potatoes for many years without a rotation, it is mainly owing to the potash having been used up that the soil is not liberal in its return of tubers.

Deep, friable, well-drained alluvial loams rich in organic matter, and capable of absorbing and retaining moisture, form ideal soil, provided they are situated in a suitable and sufficiently moist climate. Forest and scrub soils approaching this physical condition, and naturally enriched by potash from the burning-off of timber, are also good for potato production. The growth and development of tubers demand a

loose soil. Heavy soils, which crack readily or set hard, are unfavourable. Wet, sour, and clay soils should be avoided, as they have a tendency to produce waxy potatoes of poor quality. Sandy soils lacking organic matter are not suitable for continuous production. As a general rule, fertile loams, virgin soils, properly prepared, give the best results.

*Preparation of the Soil.*—While the successful raising of marketable potato crops is dependent largely on the character of the land and the season experienced, the chief factor lies in its proper preparation.

Hurriedly prepared fields are only courting a partial failure or serious reduction in yield. Generally speaking, the heaviest falls of rain come in the latter end of summer, and the winter months are inclined to show averages slightly below normal. Assuming that it is intended to take advantage also of the mellowing and sweetening influences of frost and plant immediately it is safe after the winter, it is imperative that on virgin soils, apart from scrub land, the work of preparation should extend over several months. Operations should be directed in accordance with varying local conditions, but it remains that certain fixed objects must be kept in view—the primary one being tilth, and the secondary a retention of moisture for the approaching planting season and the development of the crop. Any encroachment of weeds or grass on the "fallowing" land will have as its corollary an unsatisfactory condition for all subsequent operations, and, if fouled in this way, the work of the potato-digger is very much hampered.

Cultivate deeply and in accordance with the nature of the soil. On virgin land shallow "breaking up"—say, in October or early November—with an English type mould-board plough to invert the furrow slice, is commended. Should couch be present, the surface must be worked consistently during the hot weather with the disc and tine harrows to give all the exposure possible to dry it out. If otherwise, roll after the plough, and harrow to fill the interstices between the furrows.

Use the disc harrows just previous to cross ploughing, which should be carried out as soon as grass has rotted down sufficiently, and to a depth of not less than 6 in., which should be increased gradually in the seasons following.

It is inadvisable to create a fine surface tilth at this stage, as if tropical rains are experienced much soil washing takes place. Any inclination to surface crusting will require the early use of the tine or spring toothed cultivator, which will serve also to keep the land clean.

The ground having thus been properly prepared, the earlier the spring crop can be put in the better will be the chances of a heavy return. Where there is little danger of late frosts occurring, planting may begin at the end of August, but in low, frosty districts, planting should be deferred until there is little likelihood of the young plants being injured by frost. If planted late at this season, the crop may strike wet weather and have a tendency to produce an over-abundance of haulms and a small amount of tubers.

*Selection and Condition of Seed.*—No matter how well the land has been prepared, if the sets are inferior in quality, a full return cannot be

expected; the selection of suitable seed, apart from variety, has an important bearing upon the success of a crop.

Select from a variety true to type, well grown, uniform in character, and having a clean skin and free from disease (see specific for the disinfection of seed potatoes under the heading of "Diseases" in the pamphlet on the Potato issued by the Department of Agriculture and Stock); flesh should be firm to the touch, but yielding slightly under pressure.

The eyes require to be almost level with the surface in most varieties, and particular attention directed to the condition of the buds or young shoots. Sets in a condition to plant should have short robust sprouts; those showing a long or attenuated growth are to be avoided.

Storage in large heaps and a lack in turning the potatoes encourage this condition. Shallow layers are to be preferred, with frequent turning, and the picking out of any showing traces of rotting.

The sets for planting are either tubers too small for table use—but graded from a good crop—or those of ordinary commercial size and which have to be cut into sections.

It is generally recognised that, for conditions prevailing over most of the State, whole sets are preferable. Exceptions are to be considered in the event of a possibility of the introduction of disease, when an additional precaution may be taken by cutting, when detection is easier.

For the autumn planting, whole seed is certainly to be recommended. The reason for this lies in the fact that, if wet conditions follow after the planting of cut sets, accompanied by warm weather, the planting may be lost by rotting.

The safest season for "cut" seed is for the August or spring planting, when the soil is colder and generally not so moist.

If whole sets be used, care should be taken to procure from a reliable grower or reputable seed firm.

Very small whole potatoes are not likely to give the same results as a more robust sample about 2 in. in diameter. This latter carries a store of nourishment for the young plant, tides it over a dry time, and gives it an earlier start.

For cut seed, moderately sized tubers are to be preferred; nothing is to be gained by making small sets for reasons similar to above, and they are relatively more subject to rot.

*Number of Eyes to Set.*—Much importance is often placed as to the number of eyes that should be set, but this is of much less value than the size of set. Where several eyes may inadvertently be left on a cut set and these start simultaneously into life, or when whole potatoes are used and planted at a seasonable time, the primary shoot assumes control and gives rise generally to one stem. Exceptions occur in backward seed or if planted late in the spring, and when humid weather is experienced; then considerable suckering takes place.

*Cutting Seed.*—As to the best method of cutting the tuber into sets, it will be observed that at one end of the potato, in most varieties, there is a bunch of eyes called "the crown." In the case of the smaller-sized

potatoes all that is necessary is to cut them in half lengthways and right through the centre of crown, leaving about an equal number of eyes on each side.

With larger-sized potatoes the first cut should be made across its length and about one-third from the end opposite the crown; this "stem" end forms a set; whilst the other section is cut through the centre of crown at right angles to the first cut, making three sets in all.

Extra large potatoes should be cut evenly into four pieces with a regular cut lengthways as before noted, and then crossways or else into pieces containing from two to three eyes and weighing about 2½ oz. each. A thin knife is preferable, and should pass more freely through a seed potato than a crisp table one.

*Time to Cut.*—This should be done a day previous to planting to allow the raw surface to heal up; a sprinkling of wood ashes or slaked lime is advisable.

*Sprouting Seed.*—Mention has been made previously as to the difficulty of maintaining supplies of seed for the two plantings—July-August and in February—obtainable during the twelve months in this State, necessitating an importation for one planting, as the time between the harvesting of one crop and the planting of the next is so short. Changes of seed from a cooler climate are thus assured, as, if otherwise and an attempt was made to carry on with an early maturing variety, its vitality is soon irredeemably impaired. It is possible to make use of a quick-maturing variety to provide seed for a succeeding planting, provided it is put in early and harvested as soon as "ripe," and then shortly afterwards spreading out the potatoes in a shed or barn in shallow layers to dry thoroughly. Exposure to strong light will turn the colour of skins to a greenish hue, and the process will assist in prolonging their keeping qualities even when planted again.

If bagged subsequently, they will sprout much earlier than if kept in a large heap in a shed, which if moist will have a tendency to cause decay in the potatoes, and when they do sprout the shoots will be nothing like as robust as the treated seed.

Stored potatoes require to be frequently turned and picked over to take out decaying tubers.

*Amount of Seed per Acre.*—This will vary and depend on the class and size of sets. Usually 7 cwt. to the acre may be taken as an average.

*Planting.*—It is generally recognised that the earlier the spring crop can be put in, the better the chances of a heavy return, assuming, of course, that conditions are favourable. A late crop, or an unseasonable variety planted at this season, may strike humid weather and have a tendency to produce an over-abundance of haulms and a minimum amount of tubers.

For the autumn crop, the time is regulated by being put in sufficiently early to allow the tubers to grow and mature before the advent of frost. Whether the crop is to be planted on the flat or ridge will depend largely on the soil and environment. In dry localities, planting and subsequent working should be kept on the flat; the potatoes

being planted every 15 in., and at a depth of approximately 4 in., immediately after the plough, and in every third or fourth furrow, according to the width being cut, so as to bring the rows from 32 to 36 in. apart, and allow for horse cultivation. When ploughed in, whether with disc or other type, it is preferable to plant on the side of the furrow rather than the bottom, to prevent trampling of seed potatoes by horses. For ridge planting, the double mould-board hilling type of plough is to be preferred, but the single plough may be used; in any case the furrows should be planted up and filled in as quickly as possible after opening. Care should be taken in setting the hilling plough so that it will leave a hollow rather than a pointed crown. In the event of the use of fertilisers, reference should be made to the previous notes governing their application.

When opening furrows, undue exposure should be avoided and the planting and covering in arranged simultaneously; three good planters will keep one plough going. Machines may be used with advantage where large areas are planted; these are designed to complete the opening, the planting, and covering in at one operation.

*After Cultivation.*—The first cultivation should be given just after the young plants show up through the ground. Light lever harrows, with the tines set back from the perpendicular, are to be recommended.

A pair of light home-made harrows, useful for any class of work where "hills" are put up, can be made in a half-moon shape with short tines; these overcome the damage often associated with heavy and flat harrows which do not possess the adjustable tines.

Scuffling between the rows is most important, the ordinary Planet Junior type of machine being used, at least twice. The manner in which the ground has been worked will determine how the tines should be adjusted, so that the earth may be moulded in as desired towards the plants at each cultivation, taking care not to stir too closely or too deeply to disturb the roots.

Where hilling is practised, a special mould-board type of sweep can be attached to the machine for the purpose of combining the two operations at the time of the last stroke of the scuffler. The moulding over of friable soil is important in relation to protecting the tubers from the attack of the potato moth, also to prevent discoloration of potatoes which may be exposed to sunlight, and, if in cold districts where an autumn crop is obtainable, a protection of this character helps to save the potatoes from severe frost bite, if they have to remain any length of time before lifting.

Hilling up with the double-mould plough is advisable in damp positions and in situations where this class of work is required; and it is equally as important to give the ridges plenty of body and not bring them to a point.

No further horse cultivation is required between the rows after earthing up.

*Harvesting.*—To anticipate a harvest is to take reasonable precautions other than careful cultural operations to get one, by paying attention to directions laid down, as preventive measures against blight, and the various troubles incidental to potato-growing.

When the crop is sufficiently ripe, this is generally ascertained by the dying down of the haulms, also by the condition of the skin of the potatoes, which should be fairly dry and set, and not readily peeled off.

Early frosts will often hasten the harvesting of the autumn crop, but in the case of the summer-ripening crop, growth is prolonged, and careful observation is necessary to determine how soon they can be lifted, as the hot weather, and at times the potato moth, make it expedient to harvest as soon as ready. Another reason is that some varieties have a predilection to a second growth.

The means adopted in the harvesting of the crop are many.

The flat-pronged digging fork is still in vogue, but where large fields have to be dealt with it is too slow and expensive, contract prices running from 1s. to 1s. 3d. a bag, and in some cases up to 1s. 6d.

An ordinary single-furrow plough acts fairly well, provided the ground is worked in lands, the side of the furrows on one side of the hill being trimmed off first before ploughing the potatoes out for the "pickers."

A double mould-board plough with a specially shaped pronged share is used largely in some localities, the potatoes being left on the surface after it.

If the ground becomes fouled with weeds or grass, the disc plough may be used, and it is in such situations that a potato-digger cannot operate to any advantage.

Potato-diggers are to be recommended when they can be used on friable soil free from rubbish. Many classes are on the market, some being designed for grading the crop; but, like most machines, they cannot accommodate themselves to all conditions.

Suitable weather and other conditions are to be looked for when harvesting; the soil should be sufficiently dry so as not to stick to the tubers, and they should on no account be left lying exposed to the hot sun or to strong winds, which have a damaging effect on their keeping qualities.

*Grading.*—No grower can afford to neglect this most important feature. The vagaries of the market may at times shatter the good intentions of those who carefully class their products, but it is well known that the law of averages does not apply to a line of mixed-sized potatoes, and a depreciated price has to be accepted when the smaller and unmarketable stuff is included with that of better quality.

With a partly perishable product, there is usually little inducement to hold over for a rise, particularly with the summer crop when the wet season is at hand; and there is, moreover, always a fair and sometimes a heavy percentage of unmarketable potatoes after storing, as well as the extra cost entailed in picking over to be considered.

Potatoes of a regular and uniform size are preferred by the large consumer. The grower who can arrange his grading by a machine or with the "pickers up," in the field, does so to his own advantage.

Once in the barn, under cover, sorting-machines certainly facilitate this work; and, if a grower is specialising in seed potatoes, there is some

justification in rehandling the "smalls," to cater for the "seed" trade with an even selection of the first grade, and brand up his marketable stuff with his own name or trade mark.

A recommendation has been made that when potatoes are stored they should be kept in thin layers, a dry airy place being preferred. There is little gained in neglecting to protect the open bags of potatoes in the field, as it is here that infestation may readily take place by the potato moth, owing to a practice (which is to be deprecated) of covering the open bags with a bundle of potato haulms.

*The Varieties to Grow.*—Several references have been made to the seasons and conditions governing the supply of seed potatoes to suit this State's varied requirements.

To recommend varieties—let them be early, medium, or late—is to conjure up the fact that our climatic conditions preclude the chance of a grower arranging a continuity in the production of one or more kinds where there are two distinct seasons in the year, unless fresh seed is brought in once a year from a cooler climate. The Stanthorpe district climate resembles more than any other that of New England, for instance, and it is quite possible to use seed from an early maturing crop planted there in October, harvest it in March, and hold over for the August planting in warmer localities instead of importing seed. But, although potatoes do remarkably well in some picked spots, the Stanthorpe district (from the nature of its soils) is unlikely to produce, for some time at least, anything approaching a percentage of the seed potatoes required in more favoured potato-growing localities. Varieties regarded as standard procurable types on the market are as follows:—

Early kinds—Early Rose, Early Vermont, Bliss Triumph.

Medium—Brownell's Beauty, Satisfaction, Up to Date.

Late—Circular Heads, Guyra Blues.

*Irrigation.*—The potato is not a plant whose growth it is advisable to force. Should the land be dry at the planting season, and both the conditions and water be suitable for irrigation purposes, water may then be applied with advantage by well soaking the drills. After allowing a day or sufficient time to elapse, readily observed by noting the condition of the soil, planting may be proceeded with in the ordinary way.

A second watering, if necessary, may be given between the rows at a period when the young potatoes begin to form, but not later than this. After any form of irrigation, the breaking up of the crust or covering in, in the case of furrows, should be consistently adhered to.

*Manuring for Potatoes.*—Where manure is required on the land, it should be remembered that artificial or farmyard manures will not invariably produce the same result on different soils. The rich black and red soils of the Darling Downs, for instance, contain certain constituents which are wanting in the lighter Western or coast soils. In some, there is already a sufficiency of phosphoric acid; consequently an application of superphosphate might prove injurious. Where cultivation grounds are deficient, as most of them are, in phosphoric acid, it becomes necessary, in order to obtain a better crop, to secure support in the

form of an easily soluble phosphoric acid. Bonedust is a phosphoric acid manure which gives this result; but superphosphates produce better and quicker results.

For potatoes, a fertiliser rich in potash is essential. For general purposes a good mixed fertiliser for this crop should consist of—Available phosphoric acid, 7 per cent.; potash, 11 per cent.; nitrogen, 3 per cent.; 700 lb. to the acre.

Sulphate of potash is mostly employed as a source of potash for potatoes. Muriate of potash is said to give even better results than the former.

Dried blood contains, on an average, 11 to 13 per cent. of nitrogen, but it is less soluble than sulphate of ammonia and nitrate of soda. Manures containing sulphate of ammonia should not be mixed with lime, nor applied to land which has been recently limed.

The value of kainit lies in its potash, of which it contains 12 per cent. It is the cheapest of the potash manures.

Following are the results of some experiments carried out by Mr. H. C. Quodling, Inspector of Agriculture, when manager of Westbrook State Farm. The manures used were—

Superphosphate, at the rate of 4 cwt. per acre.

Bonedust, at the rate of 4cwt. per acre.

Blood, at the rate of 4 cwt. per acre.

Kainit, at the rate of 4 cwt. per acre.

One plot was unmanured, and planted with cut potatoes, and in the last plot, also unmanured, the potatoes were planted whole.

| Manure. | Rate per Acre. | Weight of Seed Planted. | Cut or Uncut. | Yield per Plot. | Area of Plot. |
|---|---|---|---|---|---|
| | Cwt. | Lb. | | Lb. | Acre. |
| Superphosphate .. ... ... | 4 | 178 | Cut ... ... | 716 | $\frac{1}{4}$ |
| Bonedust ... ... ... ... | 4 | 178 | ,, ... .. | 704 | $\frac{1}{4}$ |
| Blood ... ... .. ... ... | 4 | 178 | ,, ... ... | 712 | $\frac{1}{4}$ |
| Kainit... ... ... ... ... | 4 | 178 | ,, ... ... | 722 | $\frac{1}{4}$ |
| Unmanured ... ... ... ... | ... | 178 | ,, ... ... | 751 | $\frac{1}{4}$ |
| Unmanured ... ... ... ... | ... | 178 | Uncut ... | 708 | $\frac{1}{4}$ |

The best manure then, for potatoes, is a mixture of farmyard manure and some artificial. For instance, 16 tons of stable manure per acre will produce a larger crop than the most remunerative dressing of artificial manure; but, employ a mixture of 8 tons of stable manure and 3 cwt. of nitrate of soda, or an equivalent quantity of sulphate of ammonia, and a far greater yield will be obtained—in fact, such a dressing gives the greatest yield and the most remunerative results of any. If stable manure is unavailable, any artificial dressing for potatoes should contain nitrogen, phosphorus, and potash. Omit one of these (as has already been shown), and the result will be a poor crop. The omission of nitrogen will cause the greatest loss, and that of potash the least.

## THE CONSERVATION OF GRAIN.

At a recent meeting of the National Agricultural Society of New Caledonia, a communication was received from Mr. Lang, Government Veterinary Surgeon at Noumea, on an efficacious method of conserving maize and other fodder grain.

Seed of maize imported into Noumea rapidly became blackened and infested with weevils. Mr. Lang has sought a practical method of delaying, if not entirely preventing, the production of these corrupting factors, in order to utilise the grain.

Heat and humidity being the two indispensable conditons for the development of mouldiness, it appeared to be only necessary to suppress one of them—for preference, the latter—to attain the desired result. Being aware of the absorbent power of lime, Mr. Lang submitted the grain to the action of this substance. All the sheet-iron walls of a barn were white-washed to a height of about 6 ft., and in the four corners he placed four buckets of quicklime.

The lime absorbed the humidity, and notwithstanding the surrounding heat the vitality of the parasites was destroyed. Singular to say, the peculiar mouldy smell quickly disappeared, and the grain was restored to its natural bright colour. Three months after being placed in the magazine 32 tons of maize presented the appearance of perfect grain after four applications.

When replacing the lime as soon as it appeared to have lost its absorbent power, Mr. Lang, for treating 62 tons of maize, used ten kegs of quicklime, at an expense of about 1 franc (10d.) per ton. Thus, at small cost, farmers could preserve their maize grain for two months.—"Bulletin de l'Office du Gouvernement Général de l'Algerie."

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## QUEENSLAND COTTON IN ENGLAND.

In December last the Agricultural Department sent to England five samples of Queensland-grown cotton to the Dominions Royal Commission, to be valued from a commercial standpoint, in order to obtain some idea as to the prices that could be secured for Queensland cotton on the European market. The Department has received, through the Agent-General, a reply from the British Cotton Growing Association, Manchester, as follows:—

Allen's Improved Long-stapled Upland Cotton, grown at Gossypium Park, Cairns (No. 1 sample), classified as dull; staple, fine, but very irregular in length, and rather weak; value, 8d. Long-stapled Upland Cotton, Nyassaland variety, grown in the Hughenden district, classified as dull; staple, $1\frac{3}{16}$ in., mixed with short, rather weak; value, 8d. Upland Cotton in Lint, grown in the Hughenden district, classified as good colour; "f.g. middling" in grade, $1\frac{1}{8}$ in., fairly strong, good result; value, 8·30d. Upland Cotton in Lint, grown in the Miles district, classified as "f.g. middling"; staple, about 1 in., fairly strong, rather poor result; value, 8d. Cotton, Caravonica Lint, classified as fair colour;

staple $1\frac{3}{16}$ in. and $1\frac{1}{4}$ in., moderately rough; value, $8\frac{1}{2}$d. and $8\frac{3}{4}$d. Allen's Improved Long-stapled Upland Cotton, grown at Gossypium Park, Cairns (No. 2 sample), classified as dull; staple, fine, but soft and weak; staple, $1\frac{1}{8}$ in., very irregular, poor result; value, 7·80d. Long-stapled Upland Cotton, Nyassaland variety, grown at Gossypium Park, Cairns, classified as dull, rather discoloured; staple, $1\frac{1}{8}$ in., soft and weak; value, 7·80d. Caravonica Upland, grown at Gossypium Park, Cairns, classified as little stained, dull; staple, $1\frac{1}{4}$ in., rather mixed with short fibre, fair result; value, 9d. Caravonica Silk, grown at Gossypium Park, Cairns, classified as slightly stained; staple, about $1\frac{1}{4}$ in., moderately fine; value, 8·75d. The value of Middling American Cotton at date of valuation was 7·20d. The valuations are based on the assumption that the bulk would be equal to sample, and also for a commercial quantity of not less than 1 ton of lint in each case.

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## SHADE TREES.

The late Mr. L. A. Bernays, who was a most enthusiastic and scientific botanist and gardener, always maintained that in tropical and sub-tropical countries the planting of shade trees in the streets is an absolute necessity. "In a country like Queensland," he said, "when the days of sunshine are so much in excess of those of cloud, and the rays of the sun for many months of the year are so fierce, the subject of planting for shade purposes is one of much interest, and of no slight importance to the comfort and health of the inhabitants of all classes." It is curious enough, however, that the amount of tree-planting for this purpose which has been hitherto done is infinitesimally small, and that public interest shows little sign of turning towards the subject. In the very few cases in which attempts have been made at planting shade trees, they have originated with the taste and fancy of some one member of the governing body of the locality, and have not been the result of any public demand on the part of those most concerned. In this respect Queensland is far behind the other Australian States. From the above observations, however, the cities of Rockhampton, Maryborough, and Toowoomba must be excepted.

In Toowoomba especially, whole streets have been planted with fine shade trees on both sides, generally well selected, and planting is still going on. Very little has been done in the metropolis, and where trees have been planted in the past, as in Roma street and on the North Quay, with few exceptions the selection was bad, especially in the former locality. There is practically virgin ground for the efforts of some patriotic and far-seeing councillor to move his colleagues in an object of such deep concern to the ratepayers.

It must, however, in justice be remarked that there is no doubt that to the short-sighted narrowness of our principal streets is, in some degree, due the absence of shade trees; but as that reason does not apply to many miles of streets in which there is ample room, the real reason must be looked for, not so much in the narrowness of the streets as in

that of the minds of past selected representatives of the payers of local taxes. Possibly aldermen of the earlier days regarded the matter from the eminently utilitarian point of view of the Dutch councillor of an American town, who, upon being remonstrated with upon his persistent refusal to vote money for street-planting, replied, "Ef anypody want trees, let 'em moof in de country—I don't want no trees in de sid-walks!"

Mr. Bernays goes on to rate the city fathers of his day: "It is bad enough when local bodies fail to do their duty to provide the shade of trees to the hot and dusty citizen as he plods from place to place in the prosecution of his business under the rays of a vertical sun; but what can be said of the vandalism which destroys handsome and umbrageous trees, the growth of half a century or more, for the fancied reason that they obstruct the side-walk. Surely the shade, the healthiness, and the beauty of such trees may be regarded as amply compensating for the trouble of here and there having to take a step to one side. And yet this has been repeatedly done in Brisbane by men with no more sense of the beautiful than has a carpenter's rule, or a spirit-level."

At Ballarat, in Victoria, there were, as far back as 1883, no less than thirty miles of streets planted with between 5,000 and 6,000 trees, the whole being the work of the municipal authorities, some of the avenues, from their length and the handsome growth of the trees composing them, affording splendid scenic effects. The cost of planting these, including the guard, was 15s. per tree, to which must be added the cost of raising the trees, which is done in a public nursery maintained by the corporation.

Going further afield, among English-speaking communities, we find in the United States that the creation and maintenance of plantations and the planting of trees is regarded not only as an important but as an essential function of municipal bodies. So largely is tree-planting carried out in the States that, in one case, and it is probably only one of many, that of Newhaven, the number and grandeur of the trees with which it has been planted has earned for it the designation of "The City of the Elms."

Brisbane, of course, is not New York, but we have a right to expect as much enlightenment here as there.

"No one, even the most ignorant," says an American writer, "can doubt that trees add to the charms of a location. In summer time they protect it from the scorching rays of the sun, and provide pleasant and cool retreats from the heat; and in winter are of no small value in protecting our houses from the cold and piercing blasts which then prevail. Trees around a house impart a homelike and attractive appearance, and yet how few of all the houses which are built are adorned and protected by trees. The influence of homes so surrounded must be felt; and at the close of the day, when the work is done, trees present an irresistible attraction to draw families together to sit under their shade, and so exercise an undoubted influence over the mind."

If this be true in a country like the United States, how much more forcibly much of it applies to a semi-tropical country where the sun is almost always shining. The objection which obtains in temperate

climates, that trees in streets and about houses generate damp, and encourage mud, does not apply here. Again, if the remarks of that enlightened American are true as of streets and dwellings, how much more forcibly do they apply to the hundreds of our State Schools, many of which still stand in the midst of arid, treeless enclosures in which children at play are exposed to the pitiless rays of our fierce summer sun unless they confine their games to a playshed. This matter has, however, for some time been attended to, and the institution of Arbor Day has resulted in scores of schools, both in towns and in the country, being surrounded by well-selected shade trees. The writer can well recollect when, in the sixties, he was an assistant teacher in the South Brisbane Primary School the misery he endured when superintending boys and girls in a gravelly playground in the height of summer, in the pitiless sun, without a particle of shade anywhere.

The utility, the beauty, and the success of trees planted for shade purposes depends largely on the selection of species. This must depend upon the varying conditions of location, climate, soil, rainfall, area, and proximity to dwellings. The material of which the dwellings are constructed also governs the selection; as, for instance, the roots of some of the *Ficus* family, like the Moreton Bay Fig, are apt to get into the interstices of brick and stone work, and into drain pipes, thus doing much mischief. We can remember seeing in Germany a magnificent double avenue of immense poplar trees having to be cut down and rooted out owing to the damage done by the roots, and we believe that at Warwick numbers of fine willows near the waterworks had to be destroyed owing to the quantity of water absorbed by them, which in dry seasons had a serious effect on the water supply.

In temperate, and especially in damp climates, there is an actual advantage in deciduous trees, which in winter do not obstruct the sun's rays where these are all wanted. Even in our Queensland climate there are conditions in which deciduous trees may be advantageous. In the more thickly populated parts of cities, the atmosphere is often vitiated with smoke and noxious vapours, which prejudicially affect the health and appearance of evergreen trees, which, instead of things of beauty, become eyesores. Not so with deciduous trees. Every year they cast off their leaves, and with them the season's smoke and dirt. They have the further advantage of, once a year, producing fine effects when bursting into leaf or flower, the new and vigorous growth long resisting the malign influences of an unhealthy atmosphere. When these begin to be visible, the time has again arrived for the trees to discard their foliage, which is the only part injured, and put on their winter appearance. Even in warm climates the shade is not required in winter, and the shade of deciduous trees outside houses is analogous to that of blinds inside, and these trees have the advantage of being self-acting, keeping time with our seasons.

Of the deciduous trees the plane tree is perhaps the best of all, adapting itself to a considerable range of climate. It thrives equally well where the magnolia, camellia and azalea grow luxuriantly in the open. A most graceful, as well as stately looking tree in foliage, it

retains much of these characteristics when the leaves have fallen, being wholly without the gaunt and ungainly appearance of many deciduous trees during their period of rest. Fine specimens of this tree may be seen by travellers on the Southern and Western line, at the railway station at Grandchester. Their power of recuperation after injury is remarkable. Some evil-disposed person once "rung" the beautiful trees mentioned, and the curator of the Botanic Gardens, Mr. Walter Hill, we believe, succeeded in saving them and they have developed into magnificent trees. For street-planting in this country what is wanted are trees with wide-spreading heads to break the force of the sun, and planted as close as possible consistently with the free action of the roots, so as to bring about the result, as nearly as may be, of a continuous avenue. Too close planting, however, is a mistake, nothing less than 25 ft. apart being sufficient for ultimate growth.

There is no excuse for not planting about our houses, because the means are within reach of everyone. How many houses are built in this State with their fronts to the morning sun and the rear exposed to the fierce mid-day and western sun's rays, to the detriment of the health and comfort of the inmates and to the damage of paintwork. Another great advantage of trees is, that they exercise an important influence over the climate and rainfall of a country. This is now generally admitted, and the influence upon certain localities in the settled portions of Australia, when all the dense timber growth has been cleared off, is already making itself felt in the consequent diminished rainfall.

The enormous amount of clearing which has been done wherever the soil encouraged settlement is very great and is on the increase, and if it is possible that our already dry climate is changing for the worse as settlement progresses, then so far as this State is concerned, the sooner the discovery is made the better, and a remedy applied.

## DESTRUCTION OF PRICKLY PEAR.

Mr. C. E. Corby, of Pallamallawa, who has a long experience in dealing with prickly pear, has invented a machine to eradicate this pest, which he claims is most successful. Fire is the destructive power. The machine itself looks like a motor on wheels, and by means of fans driving air through the barrel, a powerful blast is obtained, which, it is claimed, destroys the pear and its seed. The inventor states that the machine can be worked by a boy, and at a cost which (roughly) works out at 15s. per acre for dense pear, and from 6s. to 8s. for scattered pear. Mr. Geo. Valder, of the Department of Agriculture, has received the report of the officer in charge of prickly pear experiments, who gave the machine a thorough test in dense and scattered pear in February of last year, and at the end of six and twelve months respectively reported that the densest pear was completely done away with, and that, even where the pest was so thick that it was impossible to push the machine in amongst it, it had worked along the face of the growth and killed it out effectively. —"Producers' Agency."

# Dairying.

## THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF JUNE, 1914.

| Name of Cow. | Breed. | Date of Calving. | Total Milk. | Test. | Commercial Butter. | Remarks. |
|---|---|---|---|---|---|---|
| | | | Lb. | % | Lb. | |
| Lady Melba | Holstein ... ... | 6 Mar., 1914 | 754 | 4·6 | 40·86 | |
| Lady Mary... | Ayrshire ... ... | 10 Nov., 1913 | 711 | 3·6 | 29·93 | |
| Lady Maid... | Shorthorn... ... | 17 Mar., 1914 | 492 | 4·7 | 27·25 | |
| Miss Bell ... | Jersey ... ... | 25 Sept., 1913 | 395 | 5·8 | 27·10 | |
| Gretchen ... | Holstein ... ... | 6 May, 1914 | 830 | 2·8 | 26·97 | |
| Bluebelle ... | Jersey ... ... | 27 May ,, | 761 | 3·2 | 26·16 | |
| Nina ... | Shorthorn... ... | 5 April ,, | 622 | 3·4 | 24·71 | |
| Madame Melba | Holstein ... ... | 10 Nov., 1913 | 489 | 4·2 | 24·13 | |
| Glen ... | Shorthorn... ... | 27 Oct. ,, | 388 | 5·2 | 23·82 | |
| Cocoatina ... | Jersey ... ... | 20 April, 1914 | 411 | 4·8 | 23·26 | |
| Burton's Lily | Shorthorn... ... | 29 Dec., 1913 | 409 | 4·7 | 22·65 | |
| Miss Jean ... | Ayrshire ... ... | 13 Jan., 1914 | 406 | 4·6 | 22·00 | |
| Queen Kate | ,, ... ... | 4 Jan. ,, | 446 | 4·2 | 22·00 | |
| Miss Lark ... | ,, ... ... | 27 Dec., 1913 | 406 | 4·5 | 21·51 | |

Cows pastured on lucerne and natural pasture, supplemented with 20 lb. of chaff cow cane per head per day.

## IMMUNITY AGAINST MOSQUITOES.

Referring to a communication from Mr. J. D. Howlett, of Urangan, on the subject of the entire absence of mosquitoes in certain localities, which appeared in the June issue of the Journal, Mr. J. F. Keane, of Granite Creek, Carbeen, Cairns, writes in corroboration of Mr. Howlett's statement as follows:—

" Touching the enclosed cutting from a local paper headed ' Remedy against Mosquitoes ' and quoting ' Queensland Agricultural Journal,' I am pleased to be able to inform you that my house is in the middle of a small tract of land about two miles across, upon which I have never seen or heard a house fly or a mosquito. I have resided here five years and a-half, never having been more than twenty-four hours absent from the place. This entire immunity has always appeared to me most inexplicable and surprising, for the near-by conditions, such as an open rainwater tank, slaughtering gallows within a chain of the kitchen door, large sheets of shallow, still water in the vicinity, seem so favourable for the plagues. Moreover, outside the limit I have given, flies and mosquitoes are as troublesome all over the country as they are almost anywhere else in the tropics."

# The Horse.

## MULE-BREEDING IN POITOU, FRANCE.

From the "Pastoral Review," Melbourne, 16th June, 1914.

The mares used in Poitou for the breeding of mules are of northern origin, and are powerfully built, heavy animals, that have a strong resemblance to mules. Their withers' height averages 15¼ to 16¼ hands, the head is long and thin, the lips overhanging, and the ears pointed and long. The neck and chest are flat, the legs powerful, but coarse and very hairy. The colour of the coat varies. To improve the breed, about the year 1860 Flemish stallions were introduced, later, Percheron and Boulogne stallions and Breton mares, and for the last thirty years a stud book association has existed.

PLATE 40.—JACK MULE, SOLD FOR 180 GUINEAS.

The improved breed is composed of animals with more powerful necks and chests than those of the unimproved strains.

The mares are served between February and June; the foals are usually weaned at the age of six months. For the production of mules, fillies begin to be used at the age of two years. Fillies of this age, at the chief market, fetch from £24 to £36. Colts somewhat over two years make £32 to £48 upwards.

JACKS.—The Jacks used for the production of mules are commonly called "baudets." They have powerful heads, long and large ears, small eyes and deeply-built bodies, with round cruppers, and coarse legs with small hoofs. The colour should be dark; light coats and dark muzzles are avoided. For breeding purposes, jacks with long and curly

hair are preferred, as their offspring are credited with putting on flesh better than others.

The jacks are always kept in the stable, and fed on hay, straw and some oats. During the service season the rations are increased, and some wheaten or rye bread is added to them. The breeding of "baudets" is limited exclusively to private studs in the district of Melle, in Poitou. The asses are mated in August and September, immediately after the close of the service season for mares. After weaning, which takes place at the age of nine months, the foals are kept in stables. They begin to breed at the age of two and a-half years. The sales of jacks are held at the owners' stables. At the age of nine or ten months, the animals are worth from £40 to £100, at the age of two and a-half years, £80 to £160, and at four years they bring £200 to £240. First-class animals have not infrequently fetched £320 to £400. The trade in jennies is insignificant; they are sold at between £16 to £60.

MULES.—The mule of Poitou is especially suited for heavy work. Its neck is broad and muscular, its back is straight, the chest broad and deep, the loins broad, the croup round, the legs very powerful, with broad joints and small cylindrical hoofs. It stands 14¼ to 15¼ hands high. Its hair is short, rough, and generally dark-coloured. If the muzzle, the inside of the edge of the ear, and the insides of the thighs and forelegs are silver-white, then the black colour is called "boyard"; if these spots fail, the coat is described as "bouchard."

The young mule accompanies its dam in the pasture until it is weaned—usually at the age of seven or eight months. After this it is fed in the stable, and when it is two years old, it is broken in. Preparatory to being sold abroad at the age of three or four years, the animals are kept in dark stables and fed with good hay, barley, oats, and maize. They are sold only at the farms. The prices range from £24 to £40. Fattened foals from Poitou at prices of from £36 to £76 are imported by Spain, the province at Languedoc, Algeria, Belgium, Germany, and Italy. A certain number of mules are exhibited every year in Paris at the general livestock show.

## THE DEATH OF CARBINE.

Carbine, the famous racehorse (says the "New Zealand Farmer") expired at Welbeck Abbey on 10th June.

Carbine had reached the great age of twenty-nine years, and for the past couple of years had been pensioned off at the farm of his owner, the Duke of Portland. The most noted horse ever bred south of the line, Carbine had a great career on the turf, where "Old Jack," as he was familiarly called, was the idol of the sport-loving public, and immense enthusiasm was roused by his many splendid victories. Lazy, almost sleepy, at the post, he fairly revelled in his work when the field was once away, and in spite of the ever-increasing weights put on his back, he added race after race to his record until his stake winnings, here and in Australia, reached the great sum of £29,976, his victories including the

Melbourne Cup, which he won under the great weight of 10 st. 5 lb. in record time.

Carbine was bred at Sylvia Park, Auckland, and was sold as a yearling to Mr. Dan O'Brien. He raced in his colours with great success, and was then sold to the Hon. D. Wallace, the famous Victorian studmaster.

In 1895 Carbine was sold to the Duke of Portland for £13,650, and was transported to England, where he sired many winners, including the Derby winner Spearmint. During his Australian career Carbine was trained by W. S. Higinbotham, and ridden by R. Ramsay.

# Statistics.

## RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JUNE IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JUNE, 1913 AND 1914, FOR COMPARISON.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|
| | June. | No. of Years' Records. | June, 1914. | June, 1913. |
| *North Coast.* | In. | | In. | In. |
| Atherton ... ... | 1·94 | 13 | 1·68 | 0·85 |
| Cairns ... ... | 2·42 | 27 | 2·79 | 0·62 |
| Cardwell ... ... | 1·75 | 27 | 3·75 | 0·55 |
| Cooktown ... ... | 2·02 | 27 | 7·21 | 0·64 |
| Herberton ... ... | 1·02 | 27 | 2·13 | 0·72 |
| Ingham ... ... | 2·34 | 22 | 9·06 | 0·52 |
| Innisfail ... ... | 6·60 | 27 | 8·45 | 1·84 |
| Mossman ... ... | 3·46 | 5 | 3·50 | 0·69 |
| Townsville ... ... | 1·45 | 30 | 4·55 | 0·54 |
| *Central Coast.* | | | | |
| Ayr ... ... ... | 1·45 | 27 | 2·57 | 1·73 |
| Bowen ... ... | 1·76 | 27 | 4·75 | 5·42 |
| Charters Towers ... | 1·45 | 27 | 2·92 | 2·06 |
| Mackay ... ... | 2·57 | 27 | 9·17 | 3·75 |
| Proserpine ... ... | 3·81 | 11 | 12·55 | 6·69 |
| St. Lawrence ... | 2·33 | 27 | 7·09 | 4·82 |
| *South Coast.* | | | | |
| Crohamhurst ... | 4·37 | 20 | 8·81 | 4·22 |
| Biggenden ... ... | 1·91 | 14 | 2·84 | 3·68 |
| Bundaberg ... ... | 2·87 | 27 | 2·89 | 3·45 |
| Brisbane ... ... | 2·68 | 63 | 4·00 | 4·65 |
| Childers ... ... | 2·36 | 19 | 4·53 | 3·71 |
| Esk ... ... ... | 2·02 | 27 | 4·12 | 4·76 |
| Gayndah ... ... | 1·70 | 27 | 2·61 | 2·91 |
| Gympie ... ... | 2·37 | 27 | 5·58 | 5·28 |
| Glasshouse M'tains | 4·68 | 6 | 7·85 | ... |
| Kilkivan ... ... | 1·90 | 27 | 3·53 | 4·53 |
| Maryborough ... | 2·87 | 27 | 6·44 | 3·48 |
| *South Coast—continued:* | In. | | In. | In. |
| Nanango ... ... | 1·96 | 27 | 3·25 | 4·58 |
| Rockhampton ... | 2·08 | 27 | 5·33 | 3·55 |
| Woodford ... ... | 2·72 | 27 | 5·01 | 3·94 |
| Yandina ... ... | 3·89 | 21 | 9·33 | 4·39 |
| *Darling Downs.* | | | | |
| Dalby ... ... | 1·64 | 27 | 2·55 | 4·17 |
| Emu Vale ... ... | 1·32 | 17 | 1·66 | 4·47 |
| Jimbour ... ... | 1·49 | 24 | 2·03 | 4·15 |
| Miles .. ... | 1·94 | 27 | 2·91 | 4·14 |
| Stanthorpe ... | 1·92 | 27 | 2·03 | 3·93 |
| Toowoomba ... | 2·24 | 27 | 3·32 | 5·73 |
| Warwick ... ... | 1·69 | 27 | 2·15 | 3·42 |
| *Maranoa.* | | | | |
| Roma .. ... | 1·84 | 25 | 2·36 | 3·15 |
| *State Farms, &c.* | | | | |
| Gatton College ... | 1·53 | 14 | 3·01 | 4·69 |
| Gindie .. ... | 1·50 | 13 | 3·44 | 4·53 |
| Kamerunga Nurs'y | 2·85 | 23 | 2·80 | 0·39 |
| Kairi ... ... | ... | .. | 1·66 | 1·01 |
| Sugar Experiment Station, Mackay | 2·20 | 16 | 8·98 | 3·83 |
| Bungeworgorai ... | ... | ... | 2·38 | 2·73 |
| Warren ... ... | ... | ... | 4·54 | 3·51 |
| Hermitage ... | 2·01 | 7 | 2·34 | 3·96 |

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for June this year and for the same period of 1913, having been compiled from telegraphic reports, are subject to revision.

# Poultry.

## REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JUNE, 1914.

3,452 eggs were laid during the month. Most of the pens have done good work during the last fortnight. J. Murchie and the Range Poultry Farm had had only one bird each laying until the last few days, the latter producing three eggs on the 30th. J. F. Coates (Black Orpingtons) wins the monthly prize with 133 eggs. The following are the individual records:—

| Competitors. | Breed. | June. | Total. |
|---|---|---|---|
| T. Fanning | White Leghorns | 132 | 344 |
| A. T. Coomber | Do. | 100 | 317 |
| Kelvin Poultry Farm | Do. | 117 | 309 |
| Loloma Poultry Farm, N.S.W. | Do. | 100 | 246 |
| Loloma Poultry Farm, N.S.W. | Rhode Island Reds | 106 | 233 |
| Moritz Bros., S.A. | White Leghorns | 118 | 226 |
| J. T. Coates | Black Orpingtons | 133 | 223 |
| J. R. Wilson | White Leghorns | 110 | 212 |
| G. E. Austin | Do. | 77 | 207 |
| Mrs. Bieber | Brown Leghorns | 73 | 205 |
| Cowan Bros., N.S.W. | White Leghorns | 82 | 200 |
| R. Jobling, N.S.W. | Do. | 88 | 197 |
| J. Gosley | Do. | 80 | 192 |
| G. Tomlinson | Do. | 119 | 186 |
| J. D. Nicholson, N.S.W. | Do. | 100 | 182 |
| A. F. Camkin, N.S.W. | Do. | 92 | 180 |
| R. Burns | Black Orpingtons (No. 1) | 115 | 179 |
| J. Kilroe | White Leghorns (No. 1) | 89 | 174 |
| J. M. Manson | Do. (No. 1) | 79 | 165 |
| J. N. Waugh, N.S.W. | Do. | 96 | 162 |
| Marville Poultry Farm, Victoria | Do. | 91 | 157 |
| R. Burns | S. L. Wyandottes | 111 | 153 |
| J. Kilroe | White Leghorns (No. 2) | 49 | 151 |
| E. Le Breton | Do. | 95 | 148 |
| Mrs. Munro | Do. | 69 | 147 |
| R. Burns | Black Orpingtons (No. 2) | 102 | 146 |
| J. T. Coates | White Leghorns | 80 | 146 |
| A. H. Padman, S.A. | Do. | 72 | 143 |
| J. Franklin | Do. | 92 | 141 |
| Derrylin Poultry Farm | Do. | 87 | 138 |
| F. McCauley | Do. | 81 | 135 |
| E. V. Bennett, S.A. | Do. | 87 | 131 |
| D. Morton, N.S.W. | Do. | 88 | 127 |
| Mrs. W. D. Bradburne, N.S.W. | Do. | 54 | 126 |
| J. M. Manson | Do. (No. 2) | 66 | 117 |
| J. Zahl | Do. | 48 | 110 |
| C. M. Jones | Do. | 35 | 103 |
| Range Poultry Farm | Do. | 24 | 101 |
| T. Fanning | Black Orpingtons | 84 | 92 |
| J. Murchie | Brown Leghorns | 31 | 78 |
| Total | ... | 3,452 | 6,929 |

## THE HEN WHICH LAYS 300 EGGS PER ANNUM.

The "Revue Agricole" of the Island of Réunion reprints the following article on the egg-laying capabilities of different breeds of poultry from the "Agriculture Nouvelle":—

"As we announced in our article on 28th February, we propose to consider in a special manner the question of egg-laying by poultry. The great English and American journals have published long articles on the experiments carried out by Professor Dryden of the Oregon Agricultural College, and we have promised our readers to put them in touch with these experiments. At the same time, we must at once remark that it is not only amongst the American birds that one can gather very high records in this respect. Amongst our French fowls, even common barn-door fowls, one can obtain equal results with those obtained at the famous egg-laying competitions, the very great utility of which it would be futile to deny. Later on, we shall demonstrate this and support our contention by proof.

"The rapid increase in the production of eggs consists, to my mind, simply in the selection and feeding of the hens; we have stated this for twenty years, and we shall long continue to do so.

"Before considering what one can do in France, we will note what is done in foreign countries.

"It is to America and Australia that the splendid impulse given to egg-laying competitions is due. Numbers of hens of particular breeds are gathered together in pens for a year at a time; the figures as to the eggs laid are recorded; the eggs of those breeds which have proved the best layers are specially put aside for hatching, and at the end of very few years it becomes evident that the egg-laying powers of such breeds have sensibly increased. This method of selection is so elementary that we claim no credit for having foretold it long ago. The matter for astonishment is, that this method has not been more strictly adopted in our French poultry-yards.

"These competitions, moreover, furnish a valuable object-lesson as to the value of the different breeds. We could mention several, as we have taken account of them whenever they were brought to our notice. Amongst those competitions which we have in view, we will mention a very characteristic one, which took place some years ago, under the auspices of the Sydney "Daily Telegraph."

"Two simultaneous competitions were organised in two Australian Agricultural Colleges—Hawkesbury and Rockdale. Climatic differences considerably modified the yield of eggs of the different pens in one or the other college. At Rockdale, which is much more protected from cold winds, and where the intense heat of summer is not so much felt as at Hawkesbury, the average number of eggs laid was 192 per hen, whilst at Hawkesbury the average was only 106 eggs per hen. Yet at the latter

college the pens were much larger and better turfed than in those of the former. It is particularly interesting to note this. Each lot entered for competition consists of six fowls. Their food is bran mash and a mess of beef hashed and boiled, maize and wheat; every day they receive a ration of green food, consisting of cabbage and a green fodder known in that country as alfalfa—[Lucerne.—Ed.]

"Mr. Charles Voitellier, Professor of the Agronomical Institute, furnishes a complete account of this competition to the Bulletin of the Agricultural Society of Meaux. From it we ('Agriculture Nouvelle') take the following:—

> The first prize was carried off by a pen of six Black Orpingtons, which had laid 1,461 eggs in twelve months. The average weight of the eggs was 60 gr. 24, and the total weight 87 kil. 660 (over 191 lb.). The second prize fell to a pen of White Leghorns, which laid 1,443 eggs, of an average weight of 67 gr. 32, the total weight being 97 kil. 156 (about 234 lb.). The average production in the two competitions was as follows:—

HAWKESBURY AGRICULTURAL COLLEGE.

| Comparison of Number of Hens. | Breed. | Eggs per Hen. |
|---|---|---|
| 12 | Imperial .. .. .. .. .. .. .. | 200 |
| 6 | Black Hamburg .. .. .. .. .. .. | 197 |
| 12 | Langshan .. .. .. .. .. .. .. | 184 |
| 12 | Brown Leghorn, single comb .. .. .. .. | 179 |
| 12 | Andalusians .. .. .. .. .. .. .. | 179 |
| 12 | Golden Wyandotte .. .. .. .. .. .. | 178 |
| 12 | White Leghorn, Rose comb .. .. .. .. | 173 |
| 6 | Faverolles .. .. .. .. .. .. .. | 173 |
| 24 | Fawn Leghorns .. .. .. .. .. .. | 171 |
| 18 | Brown Leghorns, Rose comb .. .. .. .. | 169 |
| 120 | White Leghorns, single comb .. .. .. .. | 167 |
| 120 | Silver Wyandotte .. .. .. .. .. .. | 165 |
| 114 | Black Orpington .. .. .. .. .. .. | 158 |
| 30 | Buff Orpington .. .. .. .. .. .. | 157 |
| 12 | White Wyandotte .. .. .. .. .. .. | 149 |
| 18 | Minorcas .. .. .. .. .. .. .. | 147 |
| 12 | Buff Wyandotte .. .. .. .. .. .. | 146 |
| 6 | Campine .. .. .. .. .. .. .. | 146 |
| 6 | Ancona .. .. .. .. .. .. .. | 132 |
| 6 | English Game .. .. .. .. .. .. | 159 |

ROCKDALE.

| | | |
|---|---|---|
| 6 | Minorcas .. .. .. .. .. .. .. | 237 |
| 6 | Langshan .. .. .. .. .. .. .. | 218 |
| 6 | Black Hamburg .. .. .. .. .. .. | 216 |
| 6 | White Leghorn, Rose comb .. .. .. .. | 202 |
| 12 | Brown Leghorn, single comb .. .. .. .. | 202 |
| 78 | White Leghorn .. .. .. .. .. .. | 201 |
| 78 | Black Orpington .. .. .. .. .. .. | 197 |
| 12 | Brown Leghorn, Rose comb .. .. .. .. | 185 |
| 96 | Silver Wyandotte .. .. .. .. .. .. | 184 |

"From the value of breed point of view, the Silver Wyandottes, White Leghorns, and Black Orpingtons, represented by 120 and 114 birds on the one hand, and 78 and 96 on the other, furnish a valuable lesson. The number of birds taking part in the competitions admits of our drawing a serious conclusion as to the value of the breeds, but, nevertheless, we consider that if the aptitude for laying is a racial quality, it is still more an individual quality. In all breeds there are mediocre, good, and very good layers, and, to our mind, the choice should not fall on the hen which lays the most eggs, but on the one which produces the greatest weight of eggs, and the White Leghorns which have laid 97 kil. 154 of eggs, were more worthy of the first prize than the Black Orpingtons which had only laid 87 kil. 660. But this is a reflection by the way, with the object of emphasising that the practical selection should have been in favour of the White Leghorns which showed a special individual aptitude far superior to the hens of the same race in competition.

"It was this same view that the Americans have taken as we shall show by the experiments of Professor Dryden."

[On receipt of the June issue of the "Revue Agricole," this subject will be continued.—Ed. "Q.A.J."]

## ORANGE WINE.

In a tub or vat of 15 gal. or 20 gal. capacity, carefully cleaned, put 40 lb. of peeled oranges, rejecting any unsound ones. Then bruise the fruit, and pour 4 gal. of water over it. Stir the whole carefully, and work well with the hands until the juice and pulp are separated from the solid matter. Then let the whole rest for 10 or 24 hours, and strain through a coarse bag, with gentle pressure. A gallon of fresh water is to be added to the mash to remove any soluble matter remaining, and is strained into the other liquor. From 25 lb. to 30 lb. of white sugar are next dissolved in the must or juice thus obtained, and the measure of fluid increased by more water to 10½ gal. The must is next put in a tub or vat, over which a blanket is thrown and a board over that, and the whole kept at a temperature between 55 deg. and 60 deg. Here it must remain from 12 to 24 hours, according to the state of the fermentative process. It is then to be drawn off into a cask until the fluid nearly reaches the bunghole, so that the scum may overflow and be thrown out. As fermentation goes on, and the bulk of the liquid diminishes in the cask, the superfluous must made for that purpose should be poured in, so as to keep the liquid near the bunghole. When the fermentation diminishes still more, which may be known by the reduction of the hissing sound, the bung is driven in, and a gimlet-hole bored on one side. Put a wooden peg in this hole, and remove it from time to time to let the gas escape. When the escape of gas is too feeble to extinguish a lighted match, knock the peg in for good. Then fine the wine with a tablespoonful of isinglass, and in a few weeks it will be fit for bottling.

# State Farms.

## NOTES FROM KAMERUNGA STATE NURSERY FOR JUNE, 1914.

Rainfall for the month, 280 points; 7 days on which rain fell; maximum solar reading, 147 degrees; terrestrial, 47 degrees.

The month has been a dry one for June, the rainfall being below the average for twenty-three years, and owing to dry winds the surface soil in many parts got very dry, as, being chiefly hoe work, all could not be broken at once.

Coffee, from the few trees bearing here, is nearly finished, this being about the earliest I can remember.

In one plot the tops of yams have died down, though, owing to late planting, the tubers are scarcely one-third grown. The same is noticeable with gingers and turmeric, and so far I am unable to account for it, as they should have continued growing for another two months.

A few stools of bananas were limed at the rate of about 5 cwt. per acre, while others were manured with a complete manure.

Para rubber-trees are being tapped, and it is noticeable that those trees which received a dressing at the rate of 1 lb. of nitrate of soda per tree are milking the best.

## ROMA STATE FARM.

### REPORT FOR THE MONTH ENDING 13TH JULY, 1914.

*Meteorological.*—At time of writing wintry conditions prevail, very heavy frosts having been experienced during the past week. These will do an inestimable amount of good, as previously little cold weather has been recorded, so it was feared that an early summer was to be experienced, and that vines, deciduous fruits, &c., would have too short a resting period to benefit therefrom. The cold has also given a necessary check to the wheat crops, which, in some instances, where early sown, were inclined to be spindly and run up into short blade. In addition to the aforementioned benefits, the wintry conditions have destroyed a great deal of summer vegetation induced to grow by the mild conditions experienced a few days following the recent rains, and may prove very serviceable in reducing the number of caterpillars, &c., which are very prevalent for this period of the year.

The maximum temperature recorded was 70·5, *average* 64·7.

The minimum temperature recorded was 28·5, *average* 41·9.

*Rainfall.*—263 points, representing four wet days.

*Winter Cereals.*—These on the whole look exceptionally well, the season so far leaving very little to be desired in respect to these crops where sown at the proper season. Early sown areas are inclined to be more forward this season than for some years past, but these can be

converted into hay should the necessity arise, and those sown for this purpose can be permitted to stand for grain.

Rain has retarded cropping operations, only 15 acres having been sown of the 32 it is intended to put in since forwarding previous report.

*Orchard (Deciduous)*.—With the exception of some young apricots and peaches, and the October purple plum, the trees coming under this heading have lost their leaves. The pruning of the apricots has been begun.

*Citrus.*—These trees so far display no ill-effects from the severe frosts. The replants made this season have been kept covered at night in anticipation of a cold snap, and it is hoped that the precautions taken will prove effective.

*Vineyard.*—Some of the varieties still retain their autumn foliage. Pruning operations have been delayed in this branch owing to the absence of sufficient frost to check the flow of sap, and had not the weather as aforementioned been experienced, some of the varieties would have no doubt commenced to swell their buds.

*Peanuts.*—During the period under review a small plot of one-twentieth of an acre of these, grown from seed received through Head Office from China, have been harvested. The yield obtained was fairly good and, as they appear to be superior to the ordinary peanut in many ways, are being reserved for seed purposes, some of which will be available to growers at a price fixed by Head Office.

*Cowcane.*—A sample of this was planted some two years ago, the sets having been obtained at the National Exhibition, Brisbane. During the period it has been under observation it has withstood the dry conditions experienced well, as well as the frosts, and at time of writing is still green, though the sorghums and allied crops have been bleached for a month past.

*General.*—Live stock of all descriptions look exceptionally well.

## WARREN.

The Acting Manager, reporting on 15th July, writes:—

*Weather Conditions.*—The weather conditions during the month of June proved excellent, inasmuch that 454 points of rain were registered, this representing seven falls well distributed throughout the month.

Conditions were becoming rather critical round this district, but the good rains have relieved the anxiety felt by the farmers in general, and conditions are again satisfactory.

*Crops.*—The cereal crops progressing excellently. We have now 35 acres under winter cereals, the crop being composed of Kubanka, La Huguenot, Farrer's Durum, Cedar, and Zealand wheats, Californian feed barley, and rye. One acre has been sown with canary seed, and is now growing well.

*Maize.*—The maize crop has been completely harvested. Four varieties were sown this year, the total amount of land under maize being 14 acres. Too much stress cannot be laid on the necessity of field selec-

tion of maize for seed purposes. Maize is one of our most valuable crops, both for silage and grain, and marvellous results have been obtained in the growing of this crop in America. Their successes are, without doubt, due to a large extent to the fact that the maize has been grown from specially selected seed, care being taken to see that such seed is fertile, true to type, and adaptable to the climatic conditions and soil. The variety grown this year was Boone County White. This variety has proved itself superior in every respect to the other three varieties grown here, and too much cannot be said of it.

*Potatoes.*—The potato crop has been harvested, the result on the whole being satisfactory. The soil in which the seed was planted was of a loose, sandy nature, well drained and rich in nitrogenous matter, a crop of lucerne previously having grown there. No fertilisers were used. This was well worked up before planting and allowed to lie, a fair amount of moisture being obtained. The varieties planted were as follows:—Up-to-Date, Cannan No. 1, Brounell's Beauty, and Defiance.

Up-to-Date: This is a flattish, white-skinned, kidney-shaped variety, with very few eyes. It is usually a very heavy cropper. In this case the seed was well sprouted and uncut. Germination proved good, but subsequent growth checked. This gave a fair yield, but not what was anticipated. The early frosts in May killed the haulms, but did not harm the tubers.

Cannan No. 1: This is a white-skinned tuber, of excellent appearance, and a good cropper under favourable conditions, being well liked on the market for its cooking qualities. The seed in this case was very poor and on the large side. The seed was cut when planted. Germination was very uneven, and in after-growth the plants ran mostly to top. The resultant yield was poor, this variety proving unsuccessful when compared with the others.

Brounell's Beauty: This is, without doubt, the best variety for our district, and is widely grown all over the State. There is no red skin variety better known and no potato more largely grown and giving such splendid results. It is a very heavy yielding variety, and can nearly always be depended upon. One of the finest table potatoes in cultivation. The seed was cut, and the resultant yield heavy. This potato can be recommended.

Defiance: A new white-skinned variety, noted for its blight-resistant qualities, imported from England, where it has been grown with success. When received, the seed was well sprouted, but had been damaged to some extent in shipping. Germination proved very uneven, but subsequent growth good. When harvested, this variety did not yield heavily, the tubers being very small. A larger yield could hardly have been expected, but the crop grown from this year's seed will have a much better chance.

The potato crop, as a whole, has been practically free from disease of any kind, no signs of blight being evident.

*Dairying Operations.*—Throughout the month the cows milked well, the bountiful rains providing succulent green food. No hand feeding has been resorted to, this state of affairs being most gratifying. All young stock are in splendid condition and thriving well.

# The Orchard.

## THE MANURING OF BANANAS.

By J. C. BRÜNNICH, F.I.C., Chemist to the Department of Agriculture and Stock, Queensland.

[Paper read before International Congress of Tropical Agriculture.]

On looking through the publications on banana culture one must notice the fact that the manuring of this crop receives but scant treatment, and very few results of manurial experiments are reported. In a recent paper on Bananas and their Utilisation (1.), which undoubtedly is an up-to-date and most comprehensive treatise, the manuring of the crop gets a bare two pages out of a total of 120 pages. This is not to be wondered at when we consider that hitherto in all banana-growing countries the culture of this plant was of a most reckless nature, a veritable "Raubbau" in the fullest sense of the word, as large areas of country under bananas were simply continually cropped, for years and years, without any attention to manuring, and abandoned when the crop, due to complete exhaustion of the soil, became unprofitable. New lands had then to be taken up, cleared, and put under bananas. This state of affairs continued as long as land near the seaboard was available.

It was fortunate that in the State of Queensland such abandoned banana lands were found to be eminently suitable for the growth of other crops, and more particularly sugar-cane, and thus the great waste of leaving large stretches of fertile lands uncultivated was avoided. The banana industry itself, however, suffered as, from a yearly crop of about 4,500,000 bunches in 1898, it dropped to an average yield of a little over 1,000,000 bunches in the last few years. The cultivation, which was originally entirely in the hands of Chinamen, passed more and more into the hands of European farmers, and for this reason it was desirable to find means to utilise old banana lands again for banana culture.

The carrying out of manuring experiments in the Northern tropical district presents many difficulties, and one series of experiments established by the Department of Agriculture and Stock, under my directions, had to be abandoned. Another series was started last year in the neighbourhood of the Kamerunga State Nursery, and this already has suffered from very adverse climatic conditions—an unprecedented spell of dry weather last year, followed by exceptionally heavy rains this year.

Several manurial experiments carried out in Southern Queensland, under sub-tropical conditions, gave excellent results, and demonstrated beyond doubt that exhausted banana lands may, by thorough cultivation and the aid of heavy dressings of artificial fertilisers, produce crops equalling the crops obtained from virgin lands.

Of course, not all exhausted lands may give such good results, as it is of great importance that the soil be in good physical condition, and above all, contain a fair amount of humus.

As to the class of soil required for banana culture, authorities somewhat differ, but the contradictory statements one meets are, perhaps, more apparent than real, and are largely influenced by local conditions.

Like all tropical plants, bananas require an abundant and regular supply of moisture, and therefore the soil must possess a good water-holding capacity, still be well drained, to prevent the water becoming stagnant near the surface.

The manager of the Experimental Garden at Kivai (German East Africa) states (2.): " Bananas like moist swampy flats with a rich fat soil. Soil rich in humus always yields larger crops of bananas than clayey soil."

Against this statement, which undoubtedly is due to exceptional local conditions, we must note in Dr. Grotewold's paper on banana culture (3.), that bananas love moisture, but do not thrive in swamps. Soils must also be free from excessive amounts of salt, and flats containing an excess of salts may be made fit for cultivation by flooding them with water for some time, as practised in Columbia.

With regard to humus Henrickson states (4.) that while it is desirable it is not absolutely essential, because most of the soils producing bananas in Jamaica contain but very little humus. The typical banana soils of Annatto Bay and Port Antonia district, on the north coast, are rather heavy clays, but the most profitable plantations are on soils of loamy consistency. The soil described as the most ideal soil for bananas at Portland, by the Government Chemist, Mr. H. H. Cousins (Jamaica Bulletin, October, 1901) contains such an enormous amount of humus and plant foods, that it resembles more a rich compost than an ordinary soil, as shown by its analysis:

| | |
|---|---|
| Humus .. .. .. .. | 9·86 per cent. |
| Moisture ... .. .. .. | 24·86 per cent. |
| Combined water and organic matter | 25·10 per cent. |
| Nitrogen .. .. .. .. | ·70 per cent. |
| *Potash .. .. .. .. | ·68 per cent. |
| *Lime .. .. .. .. | 1·38 per cent. |
| *Phosphoric acid .. .. .. | 2·76 per cent. |
| *Available potash .. .. .. | ·0571 per cent. |
| *Available phosphoric acid .. .. | ·0908 per cent. |

*Calculated on the dry soil.

Other soils from St. Catherine, Jamaica, growing bananas successfully are reported by the same authority to contain—

| | |
|---|---|
| *Humus .. .. .. | 1·79—1·54 per cent. |
| *Nitrogen .. .. .. | ·157—·147 per cent. |
| *Potash .. .. .. | ·38— ·43 per cent. |
| *Lime .. .. .. .. | 1·00—1·51 per cent. |
| *Phosphoric acid .. .. | ·21— ·19 per cent. |
| *Available potash .. .. | ·0518—·0108 per cent. |
| *Available phosphoric acid .. | ·0624—·0695 per cent. |

*Calculated on air-dry soil.

These analyses quoted (5.) represent pretty well the extremes of banana soils, and the good results obtained with the two latter soils, containing rather small amounts of humus, must be due to exceptionally favourable climatic conditions.

There can be no doubt, from all the evidence obtainable, that bananas require a well-drained, loamy soil, containing a fair amount of humus, and good amounts of potash, lime, and phosphoric acid in readily available form.

With regard to the manuring of bananas, the following may be quoted:—

Bernegan states (6.) that the cultivation of bananas made enormous progress in Teneriffe, due to irrigation. The Cavendish variety is principally grown, planted 10 ft. apart, and heavily manured with dung (stable compost) and guano.

Artificial fertilisers, more particularly potash manures, give good results in the banana culture in India. (7.)

To the natives of the Lake Victoria Nyanza districts the most important culture is that of bananas. They receive the greatest care and the largest amounts of dung. (8.)

Lime is of great importance to bananas, and experiments in Panama have proved the great benefits of liming soil in the cultivation of bananas. This is also proved by our own manurial experiments.

Phosphoric acid is of great value, but more particularly potash must be supplied in liberal amounts. A number of fertiliser experiments reported by J. M. Hattrick (9.) as carried out in Queensland and in Fiji fully bear this out, and the author quoted states: *That for every 1s. spent on potash, the planter received 6s. in return.*

With regard to the conservation of humus in banana soils, it must be stated that a good deal is returned to the soil by the stalks of the plant after the bunch has been cut. The method practised in Jamaica, to cut the stalks into small pieces, is undoubtedly to be preferred to the method generally practised in Queensland of cutting the stalk down and allowing it to rot near the stool of growing bananas. It is stated (5.) that one man can chop 100 stalks into small pieces in a day. The growing of green manure crops, like velvet beans, Mauritius beans, etc., is practised in some localities and can be strongly recommended, as long as the cover crop is not allowed to grow too near to the stools, so as to prevent robbing the bananas of necessary moisture.

The only evidence about replanting of old banana lands I could find refers to Costa Rica, where periodical inundations keep up the fertility of the soil (10.). As a rule banana lands are replanted every six to seven years, but in some cases, with flooded lands, plantations fifteen years old give as good a return as in their second and third year. A porous, sandy clay is preferred for bananas.

Isolated cases of abandoned old banana fields being replanted and yielding good crops, even without the aid of manures, have been reported

in Queensland. But I have no doubt whatever that the crops, with the aid of fertilisers, would have been much better, and certainly much more lasting, as nobody can dispute the correctness of Semler's statement (11.): That no other cultivated plant exhausts the soil to such an extent as bananas.

This statement is fully borne out (1) by the comparison of the analyses of the soils from virgin land and exhausted banana land, in which the total amount of potash present is reduced by nearly one-half, and the amount of available potash remaining is less than one-tenth of that found originally (*see* "Soil Analyses," Table III.); and (2) by a study of the actual food requirements of the banana plants based on the analyses of plant and fruits of the three principal varieties, carried out in our departmental chemical laboratory. (See Table I.) From this investigation we learn that a fair crop of Cavendish bananas removes in the fruit 123 lb. of potash, 12½ lb. of phosphoric acid, and 43·7 lb. of nitrogen, whereas the stalks left on the ground contain 150 lb. of potash, 6 lb. of phosphoric acid, and 41·4 lb. of nitrogen. Practically speaking, therefore, 273 lb. of potash, or about 5 cwt. of sulphate of potash per acre, must be available to the banana plant in a readily available form to produce its growth and crop in a few months.

At the time of planning the fertiliser experiments on the exhausted lands these figures were not yet available, and our manurial basis was fixed quite arbitrarily, at K = 80 lb. potash, P = 80 lb. phosphoric acid, and N = 40 lb. nitrogen per acre.

The results of the growth during the first year were so striking that the amount of potash was doubled for all further applications, thus making our normal fertiliser to contain K = 160 lb. potash, P = 80 lb. phosphoric acid, and N = 40 lb. nitrogen, applied twice a year to normal crops, and in double quantities 2 (KPN) to crops on exhausted lands.

For the experiments, two blocks of land at the two ends of the small fertile tableland on Buderim Mountain were chosen. The results of both are practically identical, so that we need to study only the results of one. The soil is a porous, red, volcanic loam of good depth, but at the time of preparing it for cultivation, so worn out that even weeds and grass would barely grow on it. The soil contained a good amount of humus (in all cases determined after Rather's modification of the Grandeau method (12.) ) and a good amount of total phosphoric acid and nitrogen, but was low in total potash and lime, and very deficient in available phosphoric acid and potash. (See Analyses Table III.)

Each block was divided into two of 1 acre each; the first series was planted in 1909, and the second series in 1910, after being kept under a green manure crop for the year.

The land was ploughed at first shallow, with narrow furrows, harrowed and cross-harrowed several times, until all the couch grass and weeds were removed. One month before the planting the land was ploughed deeply, followed by a subsoiler working down to a depth of 18 to 24 in. The ground was again harrowed and cross-harrowed before

making the plant holes in October. The variety of bananas planted were Cavendish, the most profitable and the hardiest of the dwarf varieties, and the plant holes were made 12 ft. apart, giving 302 plants per acre, and 28 stools to each experiment. The first lot of manure was applied in the plant hole, well mixed with the soil, and the subsequent applications were made as top dressings and slightly hoed under.

I may here state that I believe, in case of old banana plantations, it is better to apply part of the artificial fertilisers in holes made with a crow-bar to a depth from 18 to 24 in. all round the banana stool at a distance of from 3 to 5 ft., and the rest as top dressing.

The Narico beans planted on the second block as a green manure crop did not grow too well, although well manured, and this must have been due to want of lime in the soil. The crop was ploughed in and the second series of bananas planted, September, 1910.

The result of the experiments as shown by the yield—Table II.—speak for themselves, and the photographs of some of the rows show the benefit of manuring in a graphic manner.

Rows 1 and 2 of the first series may be left out of account, as the land at that point is a little low-lying, and suffered from heavy wash-aways during storms in the first year of growth, and the stools were also more directly exposed to the cold winter winds.

The unmanured and lightly manured experiments showed from the very start want of vigour in the plants, and demonstrated clearly what to expect when replanting such land without artificial fertilisers, whereas the experiments with double manuring gave excellent yields. A striking feature is the formation of so-called blind bunches. The banana sucker, as soon as the bunch appears, seems to lose its vitality, the leaves drop off, and the stalk bends over and often breaks off, as if it had not sufficient strength to support the small bunch. The majority of bunches from the unmanured and slightly manured experiments were of this nature. The heavily manured plots produced good heavy bunches and the plants are much more robust to withstand the severity of the cold weather during the winter months.

In my Sixth Progress Report ("Queensland Agricultural Journal," June, 1913) I stated that the quantities of artificial fertilisers applied can be well considered a world's record, as in some instance nearly 2 tons of artificial fertilisers are applied yearly, and the cost of the manure, 2 (KPN), amounts to about £25 per acre, and in the plots where lime was applied in addition to the other fertiliser, to £29 per acre.

The average yield of the experimental plots (KPN), taking the average of eight experimental plots for three years, was 345 bunches,

with 3,035 dozens of bananas per acre per annum, at a value of, say, £38, the artificial fertiliser costing annually about £12 10s.

In the experiments 2 (KPN), we obtained an average yield of 457 bunches, with 4,330 dozen, of a value of £54 per acre, showing an increased net profit over the yield obtained from plots (KPN).

The record yield was given by Experiment 12 in 1912-13 with 30 dozen per stool (second year's crop), which, however, yielded up to March, 1914, only 14¾ dozen, whereas Experiment 20, which yielded 21¾ dozen in 1912-13 gave this last harvest 28½ dozen. Very remarkable is the yield of the two unmanured plots, 15 and 16, giving 11 and 17 dozen respectively in 1912-13, and this harvest 5½ and 16¼ dozen respectively, showing clearly the influence of the long dry period during 1913 on the unlimed and limed unmanured experiments, and proving the advantage of liming.

The owner of the experimental land also conducted on his own an experiment with a mixed artificial fertiliser, frequently used for manuring in the district. Using this fertiliser at the rate of 6 lb. per stool or 16½ cwt. per acre, he applied, expressed in our standard, ¾ K 3½ P 1½ N, but the results were exceedingly disappointing, clearly indicating the want of potash.

With regard to the application of phosphoric acid, it appears that Thomas phosphate gives good results, and in this red soil superphosphates soon change into insoluble phosphates. As superphosphates are more easily obtained, they were exclusively used for the second series.

Nitrogen acts undoubtedly best in form of dried blood, and as nitrate of lime.

The application of salt in addition to the manure, does not appear to make any appreciable difference, and it appears that the plant gets a sufficient amount of salt from the soil.

In the close neighbourhood of the experimental block the head teacher of the State School carried out some manuring experiments with bananas, besides growing different varieties. The soil was a virgin soil of good quality and the results of his experiments show that for virgin soil the application of our standard KPN (twice a year) gave the most profitable harvest.

| Application: | O | (PN) | (KPN) | 2 (KPN) |
|---|---|---|---|---|
| Cost of manure per acre .. | Nil | £9 8s. 6d. | £12 6s. 6d. | £23 4s. |
| Value of crop per acre .. .. | £28 11s. 9d. | £39 3s. | £67 2s. 3d. | £55 15s. 2d. |

The incomplete fertiliser (without potash) did but barely pay for the application of the fertiliser as compared with the unmanured plot, showing the importance of potash to the banana plant.

Of particular interest to the agriculturist will be the question, how such heavy manurial dressings affect the physical and chemical nature of the soil. New samples of soil were taken after the experiments had been in progress for four years. One sample was attained from the unmanured row, No. 15; another one was taken from the heavily manured row, No. 12, a few feet from the stools, where the fertiliser was applied; another sample was taken between rows 15 and 16; and, lastly, a sample between heavily manured rows 19 and 20, where lime was applied. This last sample shows that the manure does not spread its effect to any distance and that the plants evidently utilise it as soon as it is applied. In row 12, we find only a distinct increase in the amounts of available plant foods.

The physical condition of the soil was improved by cultivation and manuring, and the soil is now in an excellent condition, capable of producing good crops, as the plants are enabled to utilise the fertilisers easily. The owners of the experimental plots are quite convinced of the profits derived from the application of our complete fertiliser, and are continuing its use on these and other areas under bananas.

As a conclusion, I am justified to state that an application of the principles evolved from our fertiliser trials to other areas of old banana lands would lead to a considerable expansion of the industry, as it will be found that most of the old lands, all of which are in easily accessible localities, will give profitable yields.

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## TABLE I.—ANALYSES OF BANANA PLANTS AND FRUITS GROWN ON BUDERIM MOUNTAIN.

| — | Banana Plants: Ash. | | | | | | Banana Fruits: Ash. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Lady's Finger. | | Cavend'sh. | | Sugar. | | Lady's Finger. | | Cavendish. | | Sugar. | |
| | — | Pure Ash. | — | Pure Ash. | — | Pure Ash. | — | Pure Ash. | — | Pure Ash. | — | Pure Ash. |
| | | % | | % | | % | | % | | % | | % |
| Weight of green plant | 118 lb. | .. | 52 lb. | .. | 62 lb. | .. | .. | .. | .. | .. | .. | .. |
| Weight of bunch | .. | .. | .. | .. | .. | .. | 22 lb. | .. | 39 lb. | .. | 16 lb. | .. |
| Approximate number of bunches per acre | .. | .. | .. | .. | .. | .. | 432 | .. | 555 | .. | 460 | .. |
| Moisture.. per cent. | 87·69 | .. | 90·00 | .. | 85·54 | .. | 75·9 | .. | 79·8 | .. | 72·75 | .. |
| Dry material per cent. | 12·31 | .. | 10·00 | .. | 14·46 | .. | 24·1 | .. | 20·2 | .. | 27·25 | .. |
| Pure Ash per cent. | 1·14 | .. | 1·31 | .. | 1·14 | .. | 1·18 | .. | ·94 | .. | ·92 | .. |
| *Containing*— | | | | | | | | | | | | |
| Silica, $SiO_2$ | ·270 | 23·68 | ·201 | 15·34 | ·245 | 21·49 | ·082 | 6·960 | ·059 | 6·225 | ·063 | 6·923 |
| Iron and Alumina, $Fe_2O_3Al_2O_3$ | ·015 | 1·32 | ·023 | 1·77 | ·021 | 1·88 | ·033 | 2·835 | ·010 | 1·112 | ·037 | 4·061 |
| Manganese Oxide, MnO | ·026 | 2·32 | ·023 | 1·77 | ·021 | 1·88 | ·001 | ·119 | ·002 | ·200 | ·001 | ·115 |
| Lime, CaO | ·219 | 19·24 | ·278 | 21·33 | ·151 | 13·25 | ·039 | 3·324 | ·020 | 2·125 | ·018 | 2·016 |
| Magnesia, MgO | ·064 | 5·66 | ·092 | 7·02 | ·100 | 8·77 | ·071 | 5·995 | ·056 | 5·925 | ·056 | 6·091 |
| Soda, $Na_2O$ | ·050 | 4·44 | ·021 | 1·60 | ·022 | 2·00 | ·033 | 2·815 | ·018 | 1·880 | ·023 | 2·506 |
| Potash, $K_2O$ | ·378 | 33·17 | ·480 | 36·64 | ·437 | 38·33 | ·734 | 62·350 | ·605 | 64·250 | ·555 | 60·625 |
| Sulphuric Acid, $SO_3$ | ·007 | ·66 | ·018 | 1·38 | ·020 | 1·75 | ·017 | 1·445 | ·013 | 1·329 | ·015 | 1·659 |
| Phosphoric Acid, $P_2O_5$ | ·030 | 2·65 | ·019 | 1·46 | ·040 | 3·52 | ·083 | 7·010 | ·058 | 6·150 | ·071 | 7·748 |
| Chlorine, Cl | ·121 | 10·62 | ·199 | 15·20 | ·103 | 9·10 | ·108 | 9·175 | ·130 | 13·900 | ·098 | 10·728 |
| Nitrogen, N | ·107 | .. | ·133 | .. | ·136 | .. | ·212 | .. | ·202 | .. | ·304 | .. |

| | Lb. of Plant Food. | | | | | | Lb. of Plant Food. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In each Plant. | In Plants per Acre. | In each Plant. | In Plants per Acre. | In each Plant. | In Plants per Acre. | In each Bunch. | In Bunches per Acre. | In each Bunch. | In Bunches per Acre. | In each Bunch. | In Bunches per Acre. |
| Lime, CaO | ·258 | 154·8 | ·044 | 86·4 | ·093 | 55·8 | ·0086 | 3·73 | ·0079 | 4·37 | ·0029 | 1·36 |
| Magnesia, MgO | ·075 | 45·0 | ·048 | 28·8 | ·062 | 37·2 | ·0155 | 6·70 | ·0217 | 12·03 | ·0089 | 4·10 |
| Potash, $K_2O$ | ·446 | 267·6 | ·250 | 150·0 | ·272 | 163·2 | ·1615 | 69·75 | ·2360 | 123·09 | ·0888 | 40·80 |
| Phosphoric Acid, $P_2O$ | ·035 | 21·0 | ·010 | 6·0 | ·025 | 15·0 | ·0182 | 7·84 | ·0226 | 12·50 | ·0113 | 5·21 |
| Nitrogen, N | ·126 | 75·6 | ·069 | 41·4 | ·084 | 50·4 | ·0466 | 20·15 | ·0787 | 43·70 | ·0486 | 2·38 |

## TABLE II.

### CROP RESULTS OF BANANA MANURING EXPERIMENTS ON BUDERIM MOUNTAIN.

### 1ST SERIES.

| Number of Experiments and Fertilisers Used. | Total of Four Years' Crops per Acre. | | Average Yield per Year per Acre. |
|---|---|---|---|
| | Dozen. | Bunches. | Dozen. |
| 1. KPNb .. .. .. .. | 5,393 | 625 | 1,348 |
| 2. 2 [KPNb] .. .. .. | 7,637 | 971 | 1,909 |
| 3. ½ [KPNb] .. .. .. | 3,047 | 528 | 762 |
| 4. Nil. .. .. .. | 442 | 86 | 110 |
| 5. ½ [KPNn] .. .. .. | 6,041 | 863 | 1,510 |
| 6. 2 [KPNn] .. .. .. | 13,650 | 1,489 | 3,412 |
| 7. KPtNn .. .. .. | 10,204 | 1,262 | 2,551 |
| 8. KPNa .. .. .. .. | 7,750 | 884 | 1,937 |
| 9. 2 [KPNa] .. .. .. | 14,034 | 1,639 | 3,508 |
| 10. KPtNa .. .. .. .. | 12,470 | 1,402 | 3,118 |

### 2ND SERIES.

| — | Total of Three Years' Crops per Acre. | | Average Yield per Year per Acre. | Crops, 1913-14, per Acre. | |
|---|---|---|---|---|---|
| | Dozen. | Bunches. | Dozen. | Dozen. | Bunches. |
| 11. 2 [KPNb] .. .. .. | 9,799 | 1,165 | 3,266 | 4,700 | 496 |
| 12. 2 [KPNn] .. .. .. .. | 12,710 | 1,413 | 4,237 | 4,470 | 432 |
| 13. 2 [KPNn] + salt .. .. | 10,435 | 1,284 | 3,478 | 4,530 | 485 |
| 14. 2 [KPNb] + salt .. .. | 10,042 | 1,230 | 3,347 | 3,880 | 400 |
| 15. Nil. .. .. .. | 5,280 | 820 | 1,760 | 1,639 | 216 |
| 16. Nil + lime .. .. | 6,489 | 971 | 2,163 | 4,910 | 550 |
| 17. 2 [KPNn] + lime .. .. | 9,966 | 1,165 | 3,322 | 4,710 | 485 |
| 18. 2 [KPNb] + lime .. .. | 10,596 | 1,262 | 3,532 | 7,070 | 712 |
| 19. 2 [KPNn] + lime + salt .. | 9,260 | 1,068 | 3,087 | 7,515 | 701 |
| 20. 2 [KPNb] + lime + salt .. | 8,969 | 1,122 | 2,989 | 7,955 | 733 |

K = 160 lb. $K_2O$ applied as 320 lb. potassium sulphate per acre.
Nb = 40 lb. N applied as 290 lb. dried blood per acre.
Nn = 40 lb. N applied as 290 lb. nitrate of lime per acre.
Na = 40 lb. N applied as 200 lb. ammonium sulphate per acre.
P = 80 lb. $P_2O_5$ applied as 470 lb. superphosphate per acre.
Pt = 80 lb. $P_2O_5$ applied as 470 lb. Thomas phosphate per acre.

2 [KPN] means double quantities; ½ [KPN] means half quantities.

All manures applied twice a year—in spring and autumn.

*Salt* applied, 2 cwt per acre; *Lime* applied in two dressings of 2 tons per acre.

## TABLE III.

### ANALYSES OF SOILS FROM MANURIAL EXPERIMENTAL PLOTS ON BUDERIM MOUNTAIN.

*Volcanic Dark Red Sandy Loam.*

| —— | Soil from adjoining *Virgin Land.* | Average Sample of Soil from Experimental Field Exhausted Land. | Soil from Unmanured Row, No. 15. | Soil from Manured Row, No. 12. |
|---|---|---|---|---|
| Date of Analysis .. .. .. | 13-3-1909 | 13-3-1909 | 31-12-1913 | 31-12-1913 |
| Reaction .. .. .. .. | Acid. | acid. | sl. acid. | acid. |
| Water capacity .. .. .. .. | 52·4 | 46·0 | 52·7 | 51·5 |
| Capillarity after 3, 6, 24, and 48 hours | 9-12-14½ | 4-5-9 | 12½-17-20½-22¾ | 11-15¼-17-18¾ |
| Mechanical analysis of fine earth— | | | | |
| Fine gravel, from 1 to 2 mm. .. | .. | 1·07 | ·88 | ·69 |
| Coarse sand, from ·5 to 1 mm. .. | .. | 2·54 | 4·11 | 3·59 |
| Medium sand, from ·25 to ·5 mm. .. | .. | 26·14 | 24·23 | 17·59 |
| Fine sand, from ·05 to ·25 mm. .. | .. | | 14·38 | 14·25 |
| Silt, from ·02 to ·05 mm. .. .. | .. | 13·16 | 7·02 | 13·14 |
| Fine silt, from ·01 to ·02 mm. .. | .. | 3·33 | 7·26 | 1·59 |
| Clay, under ·01 mm. .. .. | .. | 28·76 | 22·05 | 21·87 |
| Organic matter and water .. .. | .. | 25·00 | 23·07 | 27·28 |
| Moisture .. .. .. .. | 6·34 | 7·96 | 7·45 | 8·14 |
| Humus .. .. .. .. .. | 18·86 | 17·04 | 3·62 | 3·60 |
| Other organic matter and comb. water | | | 11·97 | 15·28 |
| Nitrogen .. .. .. .. | ·560 | ·292 | ·314 | ·325 |
| Chlorine .. .. .. .. .. | .. | .. | ·0075 | ·0050 |
| Phosphoric acid .. .. .. | ·255 | ·338 | ·160 | ·204 |
| Lime .. .. .. .. .. | ·450 | ·180 | ·260 | ·260 |
| Magnesia .. .. .. .. | ·310 | ·310 | ·141 | ·129 |
| Potash .. .. .. .. | ·109 | ·067 | ·085 | ·127 |
| Insoluble in HCl of 1·1 sp.g. .. .. | 37·72 | 31·89 | 32·22 | 31·99 |
| Soluble in 1 per cent. citric acid— | | | | |
| Phosphoric acid .. .. .. | ·0142 | ·0034 | ·0026 | ·0046 |
| Lime .. .. .. .. | .. | ·0830 | ·1380 | ·1510 |
| Potash .. .. .. .. | ·0400 | ·0035 | ·0052 | ·0312 |

## MANURING FRUIT TREES.

For maintaining fruit trees in bearing, in health and vigour, and enabling them to bear heavy crops of fruit, it is essential that they be properly nourished.

In practice, this is generally ensured by applications of fertilisers.

In order to better understand the subject, it is worth the fruit-grower's while to unearth this knowledge himself, in his own orchard.

There are three ingredients which need to be furnished through the medium of fertilisers—namely, potash, phosphoric acid, and nitrogen. The remaining essential plant food constituents are usually present in the soil in abundant quantity, and need not be supplied. Adverting to these three important constituents, it is generally safer, when the fruit-grower is not properly conversant with the tree's requirements on his

particular land, to apply all three. A one-sided manuring is not a profitable manuring, and is not productive of the best results.

In order to ascertain the requirements of fruit trees in his orchard, the fruitgrower is recommended to experiment; in other words, manure certain rows of trees in the orchard with different manurial dressings, and closely observe the results with regard to yield, size, colour, appearance, flavour, and keeping qualities of the fruit produced, and also the appearance, vigour, and disease-resistant properties of the trees, and, not the least important, the profits accruing from their application.

The beginner should remember that potassic fertilisers supply potash; phosphatic fertilisers, phosphoric acid; and nitrogenous fertilisers, nitrogen, respectively.

Examples of potash fertilisers are—

Sulphate of potash, and
Muriate of potash.

Those of phosphatic fertilisers—

Superphosphate,
Basic slag, and
Bonedust,

the last-named also supplying a little nitrogen, while

Sulphate of ammonia and
Nitrate of soda

may be cited as examples of nitrogenous fertilisers.

Supposing a fruitgrower is desirous of ascertaining whether fruit trees on his land will respond to potash, all he need do is to apply a phosphatic and nitrogenous fertiliser to a number of trees and make a note of it. Such a dressing is known as an incomplete fertiliser, as it does not supply all the three important plant food ingredients. To an equal number of trees of the same age, variety, and size, on similar land, he should apply the same amounts of phosphatic and nitrogenous fertiliser, plus, say 1 to 2 lb. sulphate of potash per tree.

Similarly, if a grower desires to find out if it will be profitable to apply phosphatic or nitrogenous fertiliser, he may proceed on similar lines, omitting the particular fertiliser which he needs the information about from the dressing, in one case, be it phosphatic or nitrogenous, and including it in another. In this way the fruitgrower may observe the behaviour of the trees towards the particular kinds of fertilisers.

Fruit crops are unlike most farm crops, in that the effects of the fertilisers are not so readily observable, and the beginner needs to be warned against expecting outstanding results the first season. The second and subsequent seasons, however, good results may follow rational manuring.

Mr. Alfred Thiessen, of Geeveston, Tasmania, laid down experiments on the three-plot system in the spring of 1912 with apple trees. The trees on the No. 1 plot were left unmanured, those on No. 2 received—

3 lb. superphosphate,
2 lb. bonedust,
½ lb. sulphate of ammonia,
1½ lb. sulphate of potash,

per tree, and those on No. 3 received

3 lb. superphosphate,
2 lb. bonedust,
½ lb. sulphate of ammonia.

The yields, calculated per acre, for the first season were:—

Plot 1, 560 cases.
Plot 2, 800 cases.
Plot 3, 666⅔ cases.

The past season's results (being the second year of experiment) were:—

Plot 1, 524½ cases.
Plot 2, 1,022¼ cases.
Plot 3, 915 cases.

The absence of fertiliser on plot 1 accounted for considerably lower yields. The trees on plots 2 and 3 each received the same amounts of superphosphate, bonedust and sulphate of ammonia. Those on plot 2 were given 1½ lb. sulphate of potash in addition.

The difference in yield, and consequently the money value, between the two plots was well marked, and showed that the complete fertiliser was the most profitable one.—"The Fruit World."

## BLACK SPOT OF THE MANDARIN.

In view of the prevalence of black spot in certain mandarin orchards in the Gosford district, the Department of Agriculture (N.S.W.) is arranging to carry out extensive experiments to determine the best methods for combating this disease. As a tentative recommendation, pending the results of these experiments, the department advises orchardists having infected trees to severely prune and remove every visible appearance of diseased limbs. As the fungal hyphæ have been traced inside the living tissues, and in this position are immune from the effects of spraying, growers are recommended to take the greatest care to ensure that all infected parts are removed, not hesitating to cut away as much as 4 in. of the live wood below the affected parts. The future shape of the tree as a result of the pruning or the length of time taken in the operation are but secondary consideration. All prunings must be burnt. This work should be begun at once, and continued during the ensuing

two months, before the trees make new growth. Constant examination of the trees is necessary, so that any further development may be detected.

*Spraying Mixture.*—After pruning, the trees and the ground beneath should be sprayed with a fungicide. Bordeaux mixture is suitable if prepared at the rate of 6 lb. lime, 4 lb. bluestone (sulphate of copper), and 50 gallons of water. Lime-sulphur spray may also be used if mixed at the rate of 53 lb. lime, 100 lb. sulphur, and 50 gallons of water, being then diluted in the proportion of 1 part of the solution to 20 parts water. Three sprayings should be given, the first immediately after pruning, the second just after the fruit has set, and the third a fortnight later. In the second and third spraying the mixture should be diluted; in the case of the Bordeaux mixture 100 gallons water should be used instead of 50, and in the case of the lime-sulphur 1 part of the solution should be added to 28 of water. In explanation of the short interval between the second and third spraying, it might be mentioned that infection of the fruit takes place at a very early stage and, owing to the waxy exterior of the fruit, it is particularly difficult to get it covered with spray at this stage, hence two sprayings within a fortnight are recommended. Later spraying, depending on weather conditions, should take place at intervals until the fruit is half grown. After reaching this stage it appears to be little affected by the fungus.—"Town and Country Journal."

## A LARGE GRANADILLA

We have received from Mr. F. Bunney, of Kin Kin, a photograph of a fine granadilla fruit, which, he says, weighed exactly 7 lb. Its length was 10¾ in., and circumference 22 in. This fruit was grown on a twelve months' old vine on which there were about twenty more ranging from 5 to 6 lb. each. Mr. Bunney, doubtless, is located on splendid soil, suitable not only for fruit but also for fodder grass, as his paspalum grew to a height of 10 ft. 6 in., one stool measuring 11 ft. 4 in., whilst Rhodes grass ran to 8 ft. 6 in. and white panicum to 6 ft. from the ground upon uncultivated scrub land, burnt off last December. We regret that the photograph is quite too dark to reproduce, but we shall be pleased to reproduce a clearer copy if one can be obtained.

## THE ALGAROBA BEAN.

Some misapprehension appears to exist as to the nature of the Algaroba or Mesquit Bean, and we have been asked whether the bean should be grown on a trellis, although we have already described the Algaroba in previous issues of the Journal. The bean is the product of a large tree which grows to a height of 40 feet. We now give an illustration of the tree, which should be sufficient to show that the plant has nothing to do with climbing beans. (See May issue of the Journal, 1914.)

PLATE 41.—THE ALGAROBA BEAN.

## PROFITS IN PEANUTS.

Mr. Bunbury (the Peanut King) of Ballendella, Vic. (writes the "Producers' Agency") estimates that as much as £350 per acre profit may be earned by growing peanuts. The wholesale price of these nuts averages 6½d. per lb., and despite importations from Japan, the demands of the Australian markets are not properly filled. Bunbury says that he has disposed of some of the crop he obtained this year (his first experience) at 1s. per lb., and thinks that even with the nuts down to 1d. per lb., the grower can make a profit of £27 per acre.

# Tropical Industries.

## SUGAR FROM THE NIPA PALM.

Attention has been drawn in these pages to the commercial possibilities of Nipa Palm (*Nipa fructians*) which covers large areas of swamp land in various parts of the tropics. The palm is found widely in Burma, Lower Bengal, the Andamans, Chittagong and Ceylon, and Papua. The requirements for its growth and proper development are said to be few, consisting of low river land subject to periodic overflow by brackish tide water. Large areas of this character, covered almost exclusively with the nipa palm, exist in several provinces of the Philippine Islands. The determination of the Philippine Government to place the manufacture of native drinks, alcohol and spirits generally, upon a revenue basis led to some investigation into the merits of this palm from an industrial standpoint. The Bureau of Science at Manila, which took up the investigation, published in 1911 two important reports covering the results of their researches. The reports, which were summarised in the "Indian Trade Journal" of 11th April, 1912, went to show that the cost of producing alcohol from the nipa palm was 2·7 cents gold per litre (1·05 quarts) as compared with 5·8 cents per litre for alcohol from sugar beets at $5 per ton; 5 cents for alcohol from sugar-cane at $3·25 per ton; 3·4 cents from cassava at $5 per ton; 6·6 cents from maize at 70 cents per 56-lb. bushel, and similar cost from other sources.

A recent issue of the "Philippine Journal of Science" publishes the results of further investigations into the possibilities of the nipa palm as a commercial source of sugar. A brief summary of the results will probably be of interest to readers who have followed the earlier investigations. It is shown that, in the Philippines, nipa palms produce about 40 litres (8·8 gallons) of sap per tree during an average season. A conservative estimate of producing palms may be placed at 750 per hectare (304 per acre), yielding 30,000 litres (6,600 gallons) of juice. The nipa district in the Provinces of Bulacan and Pampanga alone is estimated to contain 18,000 hectares (44,460 acres), and many other large areas in various islands are available for sugar manufacture.

The average season during which sap is available in sufficient quantities to supply a sugar-mill covers approximately six months. The daily collections reach a maximum during the second month, and gradually diminish after the third or fourth month.

The average nipa sap as it flows from the palm during the season contains about 15 per cent. sucrose, and has an apparent purity of not less than 85. Invert sugar is present only in traces. About 0·5 per cent. of sodium chloride slightly reduces the purity without lowering the extraction of sugar, as it is classed among the nonmelassigenic salts. Waxes, acids, pectins, and other foreign material are practically absent. The sap contains active enzymes of the invertase and peroxidase types,

the latter being present only during the final period of secretion. This peroxidase is capable of oxidizing sucrose and invert sugar in either neutral or alkaline solution.

Nipa sap may be collected without appreciable deterioration in bamboo joints or tuquils containing lime cream and sulphite. The latter may be added to the lime at the mill by passing the requisite amount of sulphur dioxide into a lime cream of proper consistency. The presence of this additional preservative in the lime cream will destroy the enzymes present and prevent deterioration of the sap. It also avoids the necessity of further bleaching. The use of small funnels for conveying the inflowing juice to the bottom of the tuquils avoids stratification and results in more perfect preservation. The additional expense attendant upon their use is slight, and more than counterbalanced by the resulting advantages.

Nipa sap can be collected and delivered to a mill on a commercial scale with negligible loss of sucrose and decrease in purity for approximately 3 pesos (1·50 dollars United States currency) per 1,000 litres (220 gallons).

Approximately 115 kilograms (253 lb.) of commercial white sugar polarising at from 99 degrees to 99·5 degrees can be recovered from 1,000 litres (220 gallons) of sap possessing average composition. In the opinion of those who conducted the investigations no important modification of methods now used in sugar practice will be necessary. Furthermore, no expense corresponding to the grinding of cane or the extraction of beets need be included in the cost of manufacture. The lack of fuel caused by absence of bagasse may be largely overcome by utilising the cheap and plentiful wood of mangrove swamps. Manufacturing sugar from nipa sap will be less expensive than from cane or sugar beet.

About 9,000 litres (1,980 gallons) of nipa sap will be required to produce 1 metric ton of 96 degree sugar; therefore, a 10-ton mill running at full capacity will necessitate 90,000 litres (19,800 gallons) of sap daily. One hectare (2·47 acres) of nipa swamp yielding 30,000 litres (6,600 gallons) of juice per season should produce from 200 to 250 litres (44 to 55 gallons) per day during the months of maximum flow. Therefore, about 450 hectares (1,111·5 acres) of good producing swamp would supply such a mill operating at full capacity during the height of the season. Many distilleries at the present time are receiving a larger volume of juice per day than is required in this estimate. Some of the factors concerning the yield of sap per hectare and the cost of production cannot be accurately determined, but, it is remarked, that this phase of the problem has been investigated as thoroughly as possible, and ample margins of safety have been allowed in every case. A mill designed to manufacture sugar from nipa juice will also be available during that portion of the year when no sap is flowing for refining Philippine sugars, in which there is a reasonable profit.

In conclusion the report states that a further study of the various enzymes present in the nipa palm is in progress to determine, if possible, the exact nature and action of the one responsible for the destruction of sugar.—" Indian Trade Journal."

## COCKRELL CANE HARVESTER.

The General Superintendent of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following letter from the Cockrell Manufacturing Co., Ltd., concerning a sugar-cane harvester, of which particulars have been given in "The Australian Sugar Journal" from time to time. In May, 1913, p. 102, vol. v., we printed the report of the committee appointed by the Louisiana Sugar Planters' Association, to deal with this subject. At p. 603 of the same volume will be found a further reference; also at p. 145 of the present volume (May issue). It need scarcely be said that at the present juncture, if such a machine could be adapted to our Queensland conditions, it would solve a very disturbing problem which we have now to face, in the high daily wage fixed for cane-cutting.

This company, which is now engaged in the manufacture of a number of sugar-cane harvesting machines for operation in Louisiana during the next grinding season (beginning in October), is investigating the plantation field conditions in every sugar-cane growing country in the world. This is with the idea of facilitating as rapidly as possible the general introduction of our machines. You may have heard that the Cockrell cane harvester has, after a period of eleven years experimentation, been perfected by F. M. Cockrell, junr., president of this company. It will cut, strip, and top the cane ready for the mill better than it can be done by hand, and will do the work of from 100 to 150 men per day. It is equipped with a form of traction which enables it to operate rapidly over the heaviest of land.

The work of developing the machine has been carried on in Louisiana alone, and, therefore, is primarily adapted to field conditions there. In the event that you may not be familiar with Louisiana field conditions, and in order that you may know the conditions under which our machine has been perfected, and that you may see what we had in mind when we wrote the enclosed list of questions, I herewith give a short description of Louisiana field conditions:—The cane is practically all grown immediately adjacent to or in the general vicinity of the watercourses, and the land is almost perfectly flat, though with a slight inclination from the rivers, and towards the swamps; the drainage ditches run from the watercourses back to the drainage canal along the edge of the swamps, and are from 100 to 150 ft. apart. It is on the drainage canal that the pumping station is located, which lifts the surplus water over the low level that separates the drained land from the swamp. The cane rows invariably run parallel to these drainage ditches, and at right angles to these ditches, and crossing them by culvert bridges are roadways or headlands, a distance of from 600 to 1,000 ft. apart. Thus, the cane is divided off into parallelograms or "cuts" bounded on the long side by the ditches, and on the short side by the roadways or headlands. The Cockrell harvester cuts one row of cane at a time by straddling the row, and the longer the run it can make without turning the more rapidly the work can be done. Therefore, it is not advantageous to stop and turn it after it has run down the row of one "cut," but it is desirable that the machine, after running down the row of one "cut," be able to

cross the headland into the next "cut," and the next, and so on, until it reaches the end of the field or plantation. It is important, therefore, from the standpoint of harvesting with the Cockrell harvester, to understand the lay of the ditches in the canefields, whether these ditches are for the purpose of drainage or irrigation.

In Louisiana, the cane rows are 6 ft. apart, from which it follows that the middles between the rows, in which the traction of our machine moves, are 6 ft. from centre to centre. The traction of the machine is aranged for cutting cane rows 6 ft. apart, but it is readily susceptible to a different arrangement where the rows are of different width. The cane rows are hilled up from 10 to 16 in.

Our machine will harvest sugar-cane properly wherever it is cultivated in fields clear of stumps or fallen timbers; planted in rows and hilled up sufficiently to give it an approximately erect habit of growing. Though we would send a representative to Australia to make a personal investigation of conditions on the plantations there before we would consider shipping any of our machines to that field, nevertheless, the information that we now ask for is for preliminary guidance, and also for those who are investing their money in our enterprise. For instance, we wish to supply these investors with undeniable proofs of the need of a mechanical cane harvester in Australia, if that need actually exists. To this end, we are also seeking to ascertain as accurately as possible the labour conditions with which the planters there are confronted. I am enclosing herewith an editorial which appeared in the issue of 24th January of the "Louisiana Planter's Magazine," published at New Orleans, and which accurately states the situation with regard to the Cockrell harvester, with the exception that for the present the machines are being manufactured in Louisville, and not in New Orleans.

The following is the article from the "Louisiana Planter," to which reference is made in the above communication:—

"Announcement has been made that the Cockrell Harvesting Company, of which Mr. F. M. Cockrell, junr., the inventor, is president, is now making its plans to put out a number of sugar-cane harvesting machines next fall, patterned after the machine which was so successfully demonstrated on Reserve Plantation early this month. These machines will in all probability be manufactured in New Orleans, and be ready for operation the first of October. Between 1st October and the opening of the grinding season they will be tuned up and prepared for regular harvesting service.

"Mr. Cockrell claims that each machine will cut, top, and strip somewhere in the neighbourhood of 300 tons of cane a day, and from the impressive manner in which the demonstrations were made at Reserve, this does not seem to be an excessive estimate upon its ability. The company will run the machines with its own skilled operatives, and the planters who secure their services will be charged at a tonnage rate for the cane cut. A comparatively small number will be put out for the season of 1914, both because of the short time in which to make them,

and because this plan is the best one to secure the introduction of the machines under proper conditions.

"Now that so much serious consideration is being given to the question of economy in production, the planters will be delighted to hear of the vigorous, progressive policy with which Mr. Cockrell and his associates have taken hold of the development of this enterprise, the immediate success of which is of such vital concern to the entire sugar industry of Louisiana.

"The observations of the machine's work at Reserve were recorded in last week's issue of 'The Planter,' and this policy of the Cockrell Harvesting Company seems fully justified by the work done by the machine. Any mechanical harvester that will do the work properly is bound to be a very great benefit to the planters, and it is peculiarly fortunate that the perfection of this machine comes just at this time, when economics in its every branch mean so much to the sugar industry.

"It is Northern capital exclusively that is going into the development of this enterprise. Mr. Cockrell has secured this backing because it was evident to him, as it is to all of us, that the planters themselves, in spite of the importance of this invention to them, are in no condition to extend financial assistance because of the bad seasons through which they have just passed. Furthermore, several efforts to invent cane harvesters have failed during the past eight or ten years, and this has made moneyed men of this section sceptical of the whole matter; so that even though inventive genius is now on the verge of commercial success, their attitude of conservation is not at all surprising. Mr. Cockrell informs us that on account of this attitude there has been no effort to secure support for his company hereabout."

## SOME PRODUCTS OF THE BANANA.

The drying of bananas for the production of "Banana Figs" was described in the July issue of the "Journal." There are other products of the fruit, such as "Banana Flour," but for this, drying machinery is needed. Briefly, the flour is made from the fully-grown, unripe fruit; that is, before the starch is changed into sugar in the ripening. It is difficult to peel green bananas, but if they are first put into scalding water (176 deg. F.) for four or five minutes, the peel is easily removed. The peeled fruit is dried in the sun, or put into a drying machine of some kind to reduce the percentage of water which it contains (70 per cent.) to 15 per cent. The bananas to be sun-dried are cut, after peeling, into thin slices, and laid out in the sun. One day's hot sun is sufficient to dry them, after which they are put into a mortar, pounded, and sifted. Two ordinary bunches will make ten quarts of flour. The flour is about equal to rice in nutritious value. It is difficult to make banana bread unless the flour is mixed with a large proportion of wheat flour.

Other products of the banana are, wine, whiskey, and alcohol. W. Fawcett, in his excellent work on the banana, and its commercial uses, says that in all exporting countries there are probably as many as

8,000,000 bunches that annually fail to come up to the high standard rightly insisted upon by the shippers. Those 8,000,000 bunches, at 6d. each, amount to £200,000 per annum. Various attempts have been made from time to time to make use of this fruit and avoid the loss. It had already been demonstrated very many years ago that bananas can be made into flour, or dried like figs, or utilised in making alcohol, and the knowledge has been, to some extent, turned to account in the present day.

*Banana Wine.*—Consideration has already been given to the preparation of flour and banana figs, but only a small proportion can be utilised in this way, and it remains to consider the use of bananas in manufacturing an alcoholic spirit. It is well known that an excellent fermented drink can be made from bananas and plantains. Ligon (1657), Dampier ("Voyages"), Speke (Central Africa), Stanley ("Darkest Africa"), Dr. Parke, and other travellers have described the native process of making banana wine as follows:—"The natives take ten or twelve ripe plantains and wash them well in a trough; then they place them in two gallons of water. In two hours' time this will ferment and froth like wort, and in four hours it is fit to drink. It will not, however, keep for more than 24 or 30 hours, so it is brewed every morning." Dampier says that it drinks brisk and cool, and is very pleasant. Dr. Parke says it is a most delicious drink.

*Banana Spirit.*—The possibility of utilising the fruit in the production of alcohol has, more than once, been under the consideration of the Academy of Sciences of France, and it was shown that during the whole growth of this fruit the saccharine matter is constituted entirely of cane-sugar, but the proportion varies considerably. Analysis by M. B. Corenwinde showed that a sound, ripe banana fruit contains as much as 22 per cent. of sugar, 16 per cent. being crystallisable and the remainder uncrystallisable. In a sugar-cane the proportion of cane-sugar present is about 18 per cent. It was hence concluded that the banana might produce an excellent alcohol.

*Banana Whisky.*—At the Central Laboratory of Guatemala, experiments were conducted which led to the production of a good spirit, something like whisky, from bananas which were about to be thrown away. Samples of this spirit were sent to the St. Louis Exposition that had only been six months in barrel. They were recognised as of superior quality, and after analysis by the Department of Agriculture, Washington, the producers were awarded a gold medal. Alcohol ages so rapidly in tropical countries, that one year in barrel is sufficient to make the product very fine. Corn whisky must be kept in casks for several years before being offered for consumption, and at least five years to obtain the best qualities. Banana whisky is ripe at the end of one year. The cost of manufacture is said to be much less than that of ordinary whisky. The yield may be estimated at about 1 gallon per bunch of bananas.

A memorandum of expenses made for a plant capable of producing 150 casks of whisky daily, aggregated 827,000 francs (about £34,458). This

estimate included buildings, machinery, apparatus, fuel, labour, administration, general expenses for two years, cases, bottles for one year, and raw material for manufacture for two years, 270,000 bunches at 75 centimes (7½d.) each.

## COIR FIBRE.

We have on several occasions pointed out that hundreds, possibly thousands, of tons of valuable fibre are allowed to rot in heaps in many of the British Colonies, and we instanced the enormous quantity of coconut husks which are allowed to go to waste in Papua, where copra is produced in several districts on the coast. Coir fibre is extensively

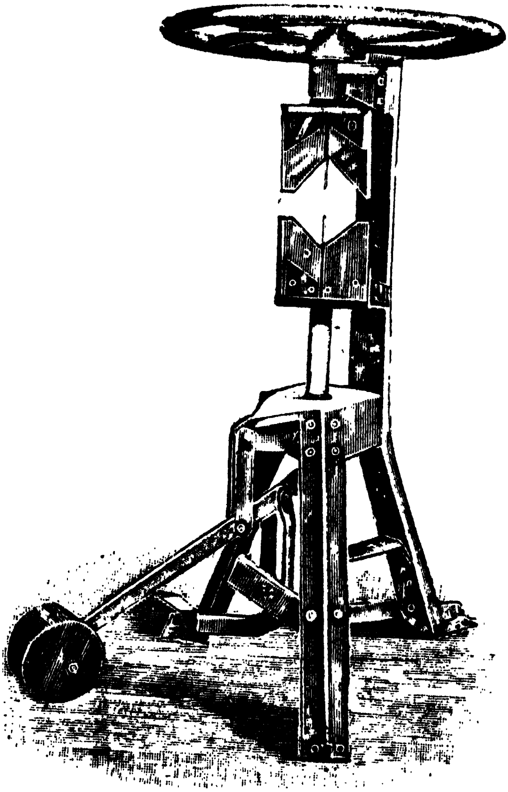


PLATE 42.

used for cordage, stair carpets, matting, bristles for brushes, brooms, &c., and when cleaned and curled, it is largely used by upholsterers for stuffing mattresses, &c. The quantity of fibre contained in a husk varies very much according to climate, season, and place of growth. In Ceylon, forty coconuts are said to yield 6 lb. of coir fibre. Three large nuts will yield 1 lb. of fibre, whereas ten small island nuts only yield about 1 lb. It is ordinarily assumed that, on an average 1,000 nuts will yield 140 to 160 lb. of fibre. Say it takes 5,000 nuts to produce 1 ton of copra: This means that from 700 to 800 lb. of fibre are wasted

in many copra-producing countries for every ton of copra produced. As clean coir is worth £18 to £20 per ton in the market, this represents a loss, less expenses of preparation, of between £6 and £7 for fibre now going to waste. In order to remove the husk from the nut, an iron spike is fixed in the ground; the nut is forced upon its point which passes through the fibres, and separates the husk from the shell. But this primitive native method, by which a man can clean about 500 nuts in a long day, has been improved upon by the invention of a machine which quickly removes the husk and enables the operator to clean 100 nuts an hour with very slight personal exertion. The machine was described in the May issue of the "Journal," 1913. The illustration shows the simplicity of the machine.

After husking, the husks are soaked in water for about six months, after which they are rolled in a crushing mill. Then they undergo the process of extracting the fibre from the husk by means of another machine called "The Extractor." Then the fibre is dried, passed over small combs or hackles to straighten it, and finally packed in bales for market. This coarse fibre, which is used for brush-making, is passed for finer work through other machines, which free it from "shorts," "hards," and other extraneous matter. Thus cleaned, it is ready for the spinning machine for the making of rope, &c. The husking machine costs in Europe about £13.

## THE REVIVAL OF SYNTHETIC RUBBER.

The following interesting remarks on the claims of the latest synthetic rubber appears in "Truth," and will no doubt be appreciated by our readers:—

"It is nearly two years since we had a synthetic scare. During the past two months the market has been threatened by a new process. Inquiry with regard to it in quarters well informed in all that relates to the chemistry of rubber showed that the newcomer was held in no better esteem than its predecessors. Samples of the material are now on view, and it is stated that an attempt is shortly to be made to raise money from the public. According to market gossip the new material is made from cotton, nitric acid, and artichokes. So wonderfully does the product of these substances resemble fine hard Para that the cleverest rubber chemists—men who are testing and analysing rubber every day of their lives—cannot distinguish it from the Brazilian product. At least, this is the statement as dished up for public consumption by the provincial newspapers; but the mere extravagance of the claim is sufficient to exclude it from notice in the recognised technical journals. Fine hard Para has a number of characteristic impurities which readily enable the chemist to distinguish it from plantation rubber. Not only does the new process supply pure rubber, but all the characteristic impurities, it seems, are also synthetically reproduced in so life-like a form as to deceive the expert. It is necessary only to remark at present that the opinion of the chemist who cannot recognise fine hard Para by

its impurities is not worth having, and I shall require testimony of a far more convincing character before I proceed to discuss the merits of the synthetic compound as a possible competitor with the natural product.''

A sample of synthetic rubber produced in Manchester has found its way to Ceylon, a Fort broker being the recipient. It has gone the round of the firms, and would probably have come in for more consideration had not one merchant cast doubts upon its genuineness. He had it subjected to a test, he said. He burnt a piece of the so-called synthetic rubber and a similar-sized piece of rubber taken from his stock-room. The residue left by each piece was exactly the same in substance, smell, and every other particular. While the matter rests at this at present, the Government Chemist is waiting the arrival of a bigger sample, which is understood to be coming out.—''Grenier's Rubber News.''

## PERENNIAL RICE.

BY C. E. WOOD, Manager, Kamerunga State Nursery.

In the February (1912) number of the ''Philippine Agricultural Review'' mention is made of the discovery of a perennial rice in Senegal, French West Africa. Considering that a rice of this nature would be a great acquisition for permanent pastures in the tropics, application was made, and the Department of Agriculture, through our Agent-General in London, procured a small parcel of seed, which was sown at the Kamerunga State Nursery. Unfortunately only one seed germinated, but, being in a pot, it was possible to give it every attention; all the other seed, whether planted in the open or in pots, failed to germinate. In January last this plant, having some three or four shoots, was put in the open ground.

The accompanying photograph A, taken in May, shows the progress made as regards height, while B gives a very clear idea as to how the plant spreads. C shows the root system, and how, by means of its creeping underground stems, the plant is enabled to spread.

In December, 1913, another parcel of seed was received, part of which was planted out in January in the open, having first been treated with a 2 per cent. solution of liver of sulphur, in case of rust. The germination of this lot was fairly good, and photograph D shows what the growth was like at the end of May, when the rice was in flower.

For testing the palatableness of this crop as a fodder, a handful or two was cut and given, first to a cow and then to a horse, both of which ate it readily; this was done just before the flowering stage. Latterly, the seeding being over, and the leaf-blades turning yellow, the crop is being cut and fed to a cow. Not only does she eat it readily, but evidently prefers it to Rhodes grass, as I tried first giving a small bundle of Rhodes before the rice; she at once left the Rhodes and finished the rice.

With regard to the nutriment value of this fodder, a small sample was sent to Mr. Brünnich, the Agricultural Chemist, for analysis, and the result was fairly satisfactory, as Mr. Brünnich classes it as "a hay

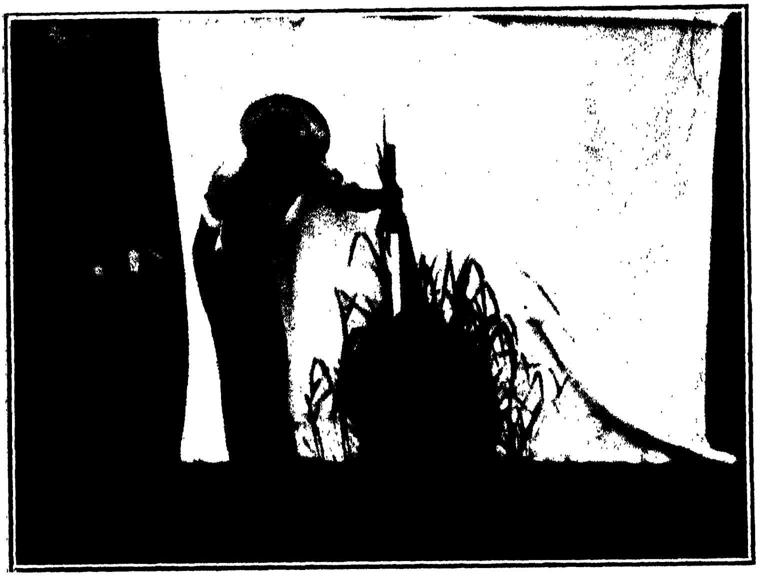


PLATE 43.—(A), SHOWING HEIGHT OF PLANT (FOUR FEET).

of very fair quality almost equal to Rhodes grass hay." From this it will be seen that the perennial rice can be classed amongst our good fodder plants. Other points—such as probable weight of green feed

PLATE 44.—(B), SHOWING SPREAD OF PLANT IN FOUR MONTHS.

per acre, lasting powers of crop, and rate of growth after being cut or fed off—have yet to be determined. A weak point which should be mentioned is the very small quantity of seed produced, the panicles,

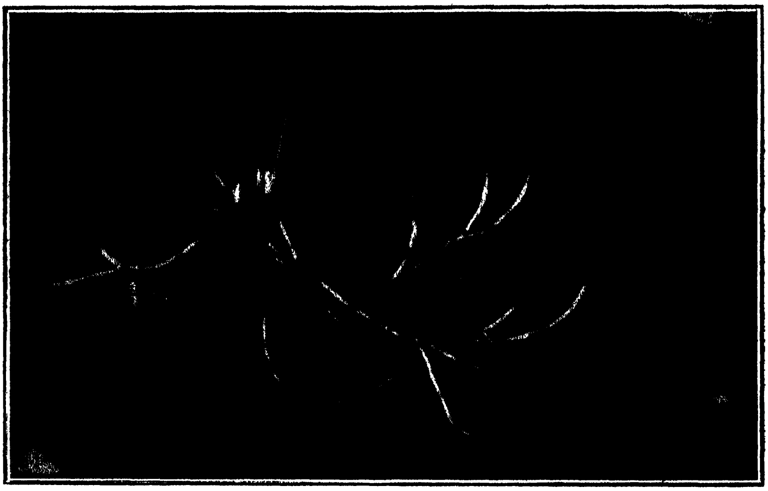


PLATE 45.—(C), ROOT SYSTEM WITH UNDERGROUND STEMS.

compared with the number of plants, being few, and from a single panicle, as shown in photograph E, two to ten seed only ripened, while many had no seed, all the glumes being empty.

PLATE 46.—(D), PERENNIAL RICE IN FLOWER.

Since this rice came to maturity, brown markings or spots have appeared on the leaf-blades, giving it rather a dirty appearance; and, to prove whether this is a form of rust which may prove harmful,

samples have been sent down to the Government Plant Pathologist. In conclusion, I would say that, while this new fodder is neither likely nor expected to be substituted for any of our good grasses, it should prove a welcome addition, being both nourishing and palatable. With regard to the seed, I have already mentioned that it is scarce; it also is a long-bearded rice, the grain being very lean and not likely to be of any use for human consumption in its present form.

PLATE 47.—(E), PANICLE OF PERENNIAL RICE.

## HINTS TO INTENDING BEEKEEPERS.

In reply to a correspondent, Mr. G. Butler, hon. secretary to the Queensland Beekeepers' Association, kindly writes:—"The local knowledge necessary as to the suitability of a district for beekeeping is to make a careful note of the various trees in close proximity to the location in which it is desired to establish an apiary. If ironbark, blue and grey gum, box, and apple trees abound in great quantities it is quite safe to commence operations in that locality. Districts where lucerne is grown extensively produce honey of a good quality; it being light in colour is much favoured by the consumer. Bloodwood yields a honey of good density, but is somewhat dark in colour. Should more than one person wish to begin beekeeping it is not advisable to place apiaries too close together. At least 2 miles should separate one from the other, or the yields of honey will be considerably curtailed. If the knowledge of beekeeping is limited, the beginner should commence in a small way, and gradually acquire a knowledge of the habits of bees. As a subsidiary occupation to farming it is often a standby when other crops fail through climatic influences. Given a good genial winter it does not matter how dry the summer may be, the yield of honey will be bountiful."

# Botany.

## ELEUSINE INDICA (CROWFOOT GRASS)—A GRASS DANGEROUS TO STOCK.

BY FRANK SMITH, B.Sc., F.I.C., AND C. T. WHITE.

The writers, in the course of an inquiry into the distribution of hydrocyanic acid containing compounds in the Queensland flora, a question of some importance, apart from its interest in plant physiology, in the field of stock-toxicology, have observed the occurrence of these compounds in certain of the grasses, among them *Eleusine indica* (Crowfoot), which apparently contained some quantity.

No originality is claimed for this observation, as Dr. J. M. Petrie had previously, in a comprehensive paper recently published in the Proceedings of the Linnean Society of New South Wales, dealt with the grasses of that State from this aspect, and their occurrence in *Eleusine* has been noticed elsewhere. The present brief notice, however, seems justified in view of the common occurrence of *Eleusine indica*, and that the possession of poisonous properties by a grass usually considered a fodder of some value has not hitherto been generally recognised.

*Eleusine indica* is a strong-growing succulent summer grass widely distributed in the tropical and sub-tropical countries of the Old World and introduced into the warmer parts of America. In Queensland it is found throughout the length and breadth of the State, mostly, however, in coastal localities. It is usually found in rich moist land, and is especially common in and around cultivation areas, waysides, &c. It is a common weed in gardens and backyards. Most stockmen are familiar with the poisonous property of immature sorghum, due to its content of a cyanogenetic glucoside (dhurrin), which in consumption is broken up, yielding the exceedingly toxic hydrocyanic acid. *Eleusine indica* must be considered to contain a similar substance. An estimation of the amount of hydrocyanic acid yielded by maceration of the fresh cut grass with water and distillation, in June of the present year, showed ·92 grains per pound, an amount equal to that in sorghum at a certain stage of growth, and in sweet potato vines, producing poisoning in pigs. It is probable that the amount of hydrocyanic acid present would be found higher under the conditions of more vigorous growth obtaining in the summer months.

The production of toxic symptoms in animals grazing cyanogenetic plants will depend upon the rate of liberation of the acid in the digestive tract, the rate being itself dependent on a variety of conditions—the amount consumed, the composition of the food with regard to its fibrous and saccharine constituents, and the condition of the digestive secretum. We have no doubt, however, that *Eleusine indica* can produce poisoning in animals feeding it, and cases of sickness in horses having access to

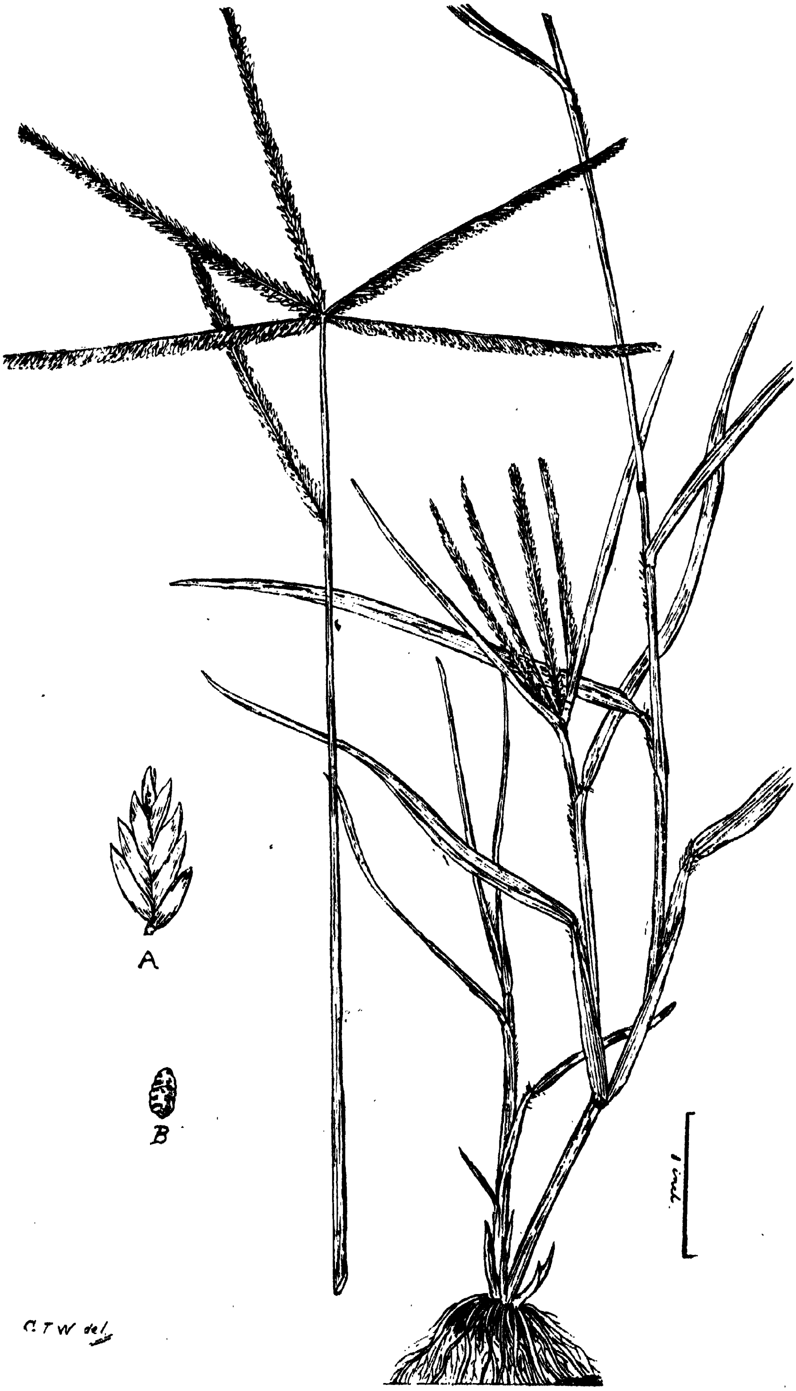



PLATE 48.—ELEUSINE INDICA, *Gaertn.* Crowfoot Grass.
A.—Spikelet. B.—Grain. (Enlarged.)

patches of this grass in cultivated land and sudden mortality of poultry on runs infested with it, which have come under our notice, are attributable to this cause.

A brief botanical description of *Eleusine indica* is appended:—

*Eleusine indica*, Gaertn (Crowfoot Grass). A strong growing tufted annual grass from 1 to 2 ft. high. Leaves narrow, numerous; sheaths flattened, distichous, ciliate, with a few long hairs; ligula membranous. Spikes 2 to 7, 2 to 4 inches long, straight, digitate, with usually one or two, rarely more, inserted rather lower down. Rhachis smooth, prominent on the upper or inner side; spikelets loosely imbricate on the opposite side; 3-6 flowered. Glumes rather obtuse (oblong-lanceolate in profile). Pericarp persistent, membranous, enclosing the dark-coloured rugose seed.

## THE NET FUNGUS.

Our illustration, reproduced from a photograph received from Mr. A. Howarth, Philpott Creek, Gayndah district, shows the peculiar net-like formation of the Net Fungus, *Clathrus cibarius*. In the young, or "egg" stage, it resembles a puff-ball, at which period of its existence it is said by some to be edible, hence the word "cibarius," meaning "relating to food" or edible.

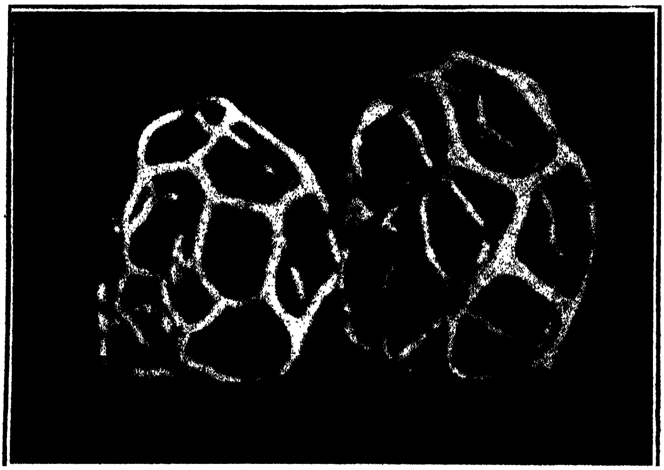


PLATE 49.—NET FUNGUS.

## THE MARBURG AND DISTRICT AGRICULTURAL AND INDUSTRIAL ASSOCIATION.

As showing the interest taken in agriculture by the above association, it is worthy of note that more than two-thirds of the prize-money in connection with the association's show in June last was allotted to Agriculture and Horticulture.

# Horticulture.

## CULTURAL DIRECTIONS FOR THE PAPAYA.

(From the "Philippine Agricultural Review.")

By P. J. WESTER, Horticulturist in Charge of Lamao Experiment Station.

*Preliminary remarks.*—The papaya is one of the commonest fruits in the Philippines, ranking next to the banana with respect to wide distribution, largely because of its rapidity of growth and early fruiting habit as compared with other fruits.

The papaya is a large succulent herb, of exceedingly rapid growth, and when well cared for produces ripe fruit within twelve months from the planting of the seed. It is very impatient of water standing around the roots and succeeds on well-drained land, sandy or loamy soils being most suitable; as it is easily injured by strong winds the papaya should be planted in well-sheltered situations.

From the grower's point of view there are three kinds of papayas: The hermaphrodite papaya, the flowers of which are perfect; the pistillate, or, as it is commonly called, the female papaya; and the staminate, or male, papaya. Of the two fruiting kinds, the hermaphrodite is preferable to the female since it is usually sweeter and better flavoured; a very great point in its favour is the fact that it is more apt to reproduce itself true to seed than the female.

The hermaphrodite papaya is distinguished by its more or less oblong or pear-shaped form, sometimes, in its best types, approaching the shape of a cucumber. The female papaya is recognised by its more roundish shape, prominent "nose," and a large seed cavity that frequently is filled with seed.

*Propagation.*—The seed bed should be prepared by thoroughly pulverising the soil by spading or hoeing the ground well and clearing away all weeds and trash. The seed should be sowed thinly, about 1 to 2 centimeters apart, and covered not more than 1 centimeter deep with soil, and the bed then watered thoroughly. In the dry season it is well to make the seed bed where it is shaded from the hot midday rays of the sun, for example, under a tree; or, it may be shaded by the erection of a small bamboo frame covered with grass or palm leaves. If the seed is sown during the rainy season a shed should always be put up over the seed bed to protect the seed from being washed away and the plants from being beaten down by the rains.

Transplanting the seedlings in the seed bed, setting them about 7 to 10 centimeters apart, when two or three true leaves have appeared, will very materially aid in the successful transfer of the seedlings to the field.

*Transplanting to the field.*—When the plants have attained a height of about 7 to 10 centimeters, they are ready for transplanting to their permanent place in the garden or the orchard.

Unless the transplanting has been preceded by a good rain, the plants should be thoroughly watered before they are removed from the seed bed. In order to reduce the evaporation of water from the plants until they are well established in their new quarters, about three-fourths of the leaf blades should be trimmed off.

In transplanting, take up the plants with a large ball of earth so that as few roots as possible are cut or disturbed. Do not set the young plant deeper in the new place than it grew in the nursery; firm the soil well around the roots, making a slight depression around the plant to hold water, and then give it a liberal watering.

In order to protect the tender plant from the sun until it is established, it is well to place around it a few leafy twigs at the time of planting. Unless the seed is of an unusually good strain it is also a good plan to set out two or three plants to each "hill." This gives the grower a better opportunity to discard male and undesirable female plants without destroying the "stand," than if only one plant is set out in each place.

If the plants can not be set out in the field at the time indicated, transplant them from the seed bed to the nursery, setting the plants 30 to 40 centimeters apart in rows 1·2 meters apart, or more, to suit the convenience of the planter. While the best plan is to set out the plants in the field before they are more than 30 centimeters tall, the plants may be transplanted from the nursery to the field with safety even after having attained a height of 2 meters (6 ft. 6 in.), *provided that all except the young and tender leaf blades are removed, leaving the entire petiole or leafstalk attached to the plant*, as shown in figure 1, and provided that, in those regions where the rains are excessive during the wet season, the work is performed during the dry season. If the entire leafstalk is left on the plant it withers and drops and a good leaf scar has formed before the fungi have had time to work their way from the leafstalk into the stem of the plant. As the tissue of the papaya plant is exceptionally favourable for the rapid development and spread of fungi, if the leafstalk is cut off *close to the stem* as shown in figure 2, the fungi invade the stem from the remaining short petioles and the plant dies.

Papayas should be planted 4 meters (about 13 ft.) apart each way on land of average fertility; on very rich land it may be desirable to set out the plants 4·5 meters apart.

*Culture.*—While the plants are small the intervening space may be planted to some upright-growing cover crop, such as mongos or cowpeas, but when the papayas come into fruiting the best plan is to keep the land clean cultivated during the dry season. For the best success it is essential that the plants are irrigated whenever the leaves show signs of wilting, and being of exceedingly rapid growth the papaya requires more water than most plants. In order to reduce evaporation and irrigation expense, the land should be cultivated as soon as it is in condition for cultivation after the flooding. The harrowing may be repeated once or twice before the field is again irrigated.

During the rainy season special attention should be given to see that there is no stagnant water in any part of the papaya plantation, and that all surface water drains off rapidly.

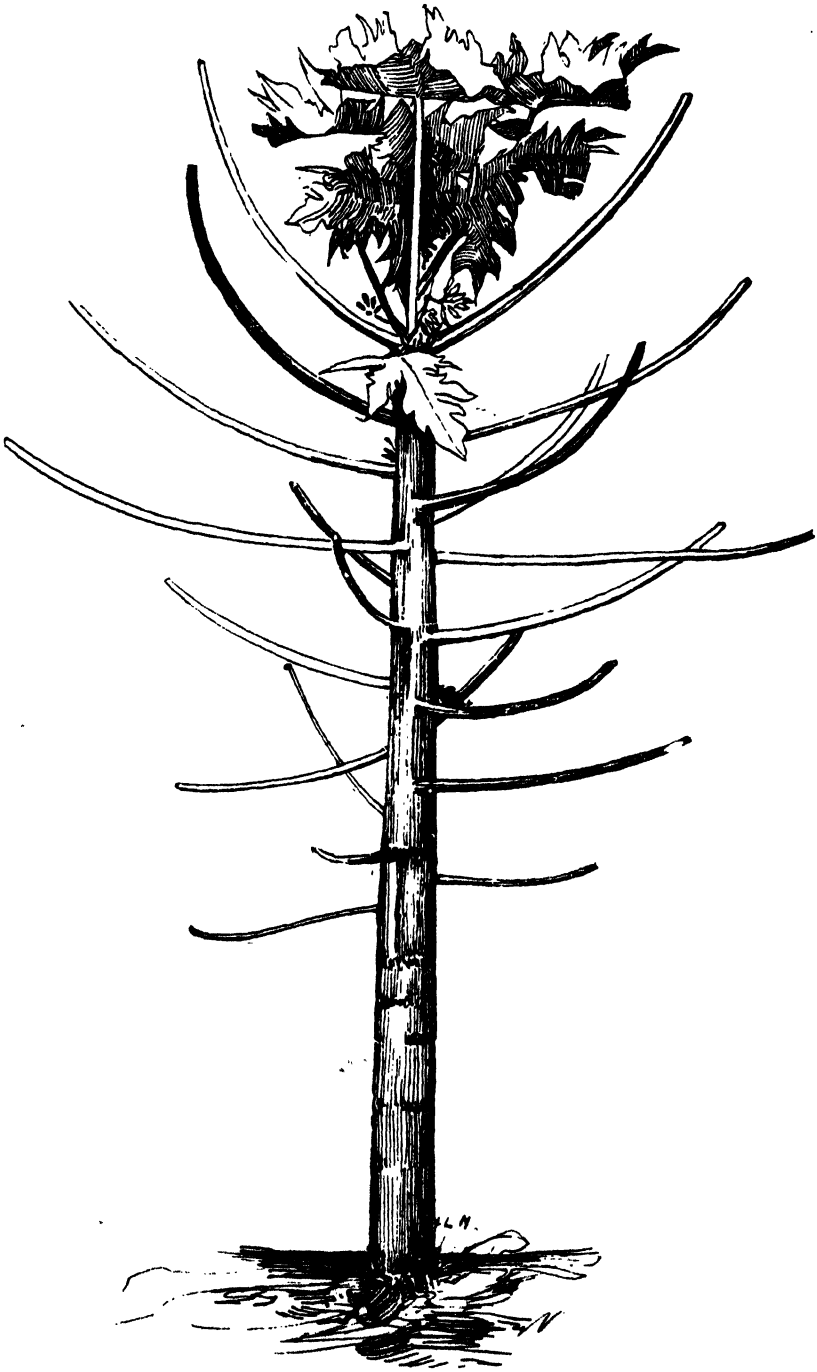



Plate 50 (Fig. 1).—The Correct Way of Pruning a Papaya Plant before Transplanting.

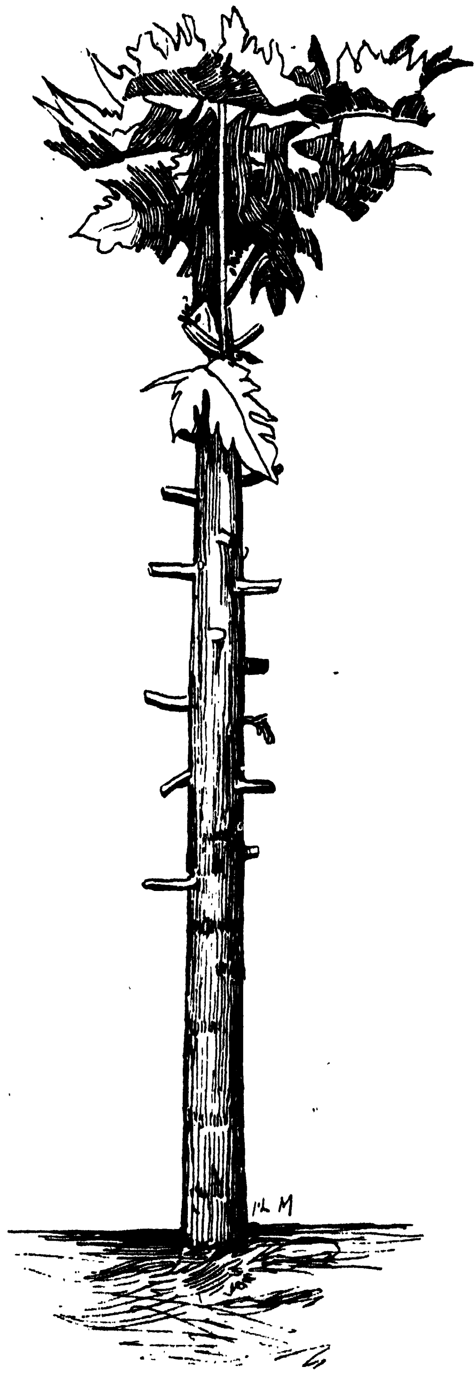


PLATE 51 (FIG. 2).—THE INCORRECT WAY OF PRUNING A PAPAYA PLANT BEFORE TRANSPLANTING.

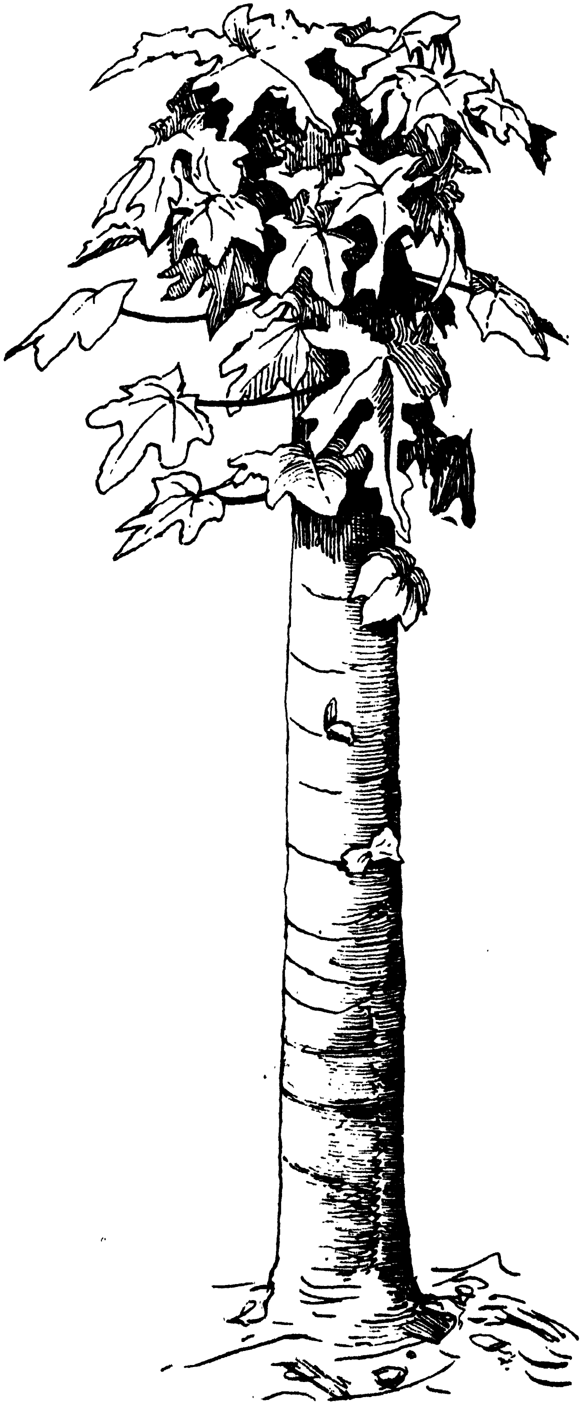


PLATE 52 (FIG. 3).—STUMP OF OLD PLANT A FEW WEEKS AFTER "DECAPITATION."

*Rejuvenation of old plants.*—When a plant has grown so tall that it is difficult to gather the fruit, which also at this stage grows small, cut off the trunk about 0·75 to 1 meter (3 ft. 3 in.) above the ground. A number of buds will sprout from the stump (figure 3), and in a surprisingly short time the old stump will have been transformed into a papaya plant in full bearing. These sprouts, except two or three, should be cut off, for if all are permitted to grow the fruit produced will be undersized.

*Seed selection.*—Seed should be saved from the best fruits only. By this is meant not so much a large fruit as one that is *sweet and well flavoured,* with a small seed cavity and few seeds. Oblong should be preferred to round fruits in saving seed, since they grow on plants having both stamens and pistils in the same flower, and these being very largely self-pollinated, the seeds produced from such flowers are more likely to reproduce their kind than the seed from round or melon-shaped fruits, which grow mostly on female plants.

All male plants should be promptly destroyed wherever they appear, as not only are they unproductive, but by their pollen being carried to others which are fruiting they tend to produce degenerate plants when these are grown from the seed obtained from plants growing in the vicinity of the male plants. There is no need to fear that the others will not fruit if the male plants are destroyed, for the reason that there are always plants near by having *perfect* flowers which provide sufficient pollen for the pollination of the females.

## TIMES OF SUNRISE AND SUNSET AT BRISBANE—1914.

| Date. | May. | | June. | | July. | | August. | |
|---|---|---|---|---|---|---|---|---|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. |
| 1 | 6·13 | 5·17 | 6·30 | 5·0 | 6·39 | 5·3 | 6·30 | 5·18 |
| 2 | 6·14 | 5·16 | 6·30 | 5·0 | 6·39 | 5·4 | 6·30 | 5·18 |
| 3 | 6·14 | 5·15 | 6·31 | 5·0 | 6·39 | 5·4 | 6·29 | 5·19 |
| 4 | 6·15 | 5·14 | 6·31 | 5·0 | 6·39 | 5·4 | 6·28 | 5·19 |
| 5 | 6·15 | 5·13 | 6·32 | 5·0 | 6·39 | 5·5 | 6·28 | 5·20 |
| 6 | 6·16 | 5·13 | 6·32 | 5·0 | 6·39 | 5·5 | 6·27 | 5·21 |
| 7 | 6·16 | 5·12 | 6·33 | 5·0 | 6·39 | 5·6 | 6·26 | 5·21 |
| 8 | 6·17 | 5·11 | 6·33 | 5·0 | 6·39 | 5·6 | 6·26 | 5·22 |
| 9 | 6·17 | 5·11 | 6·34 | 5·0 | 6·39 | 5·6 | 6·25 | 5·22 |
| 10 | 6·18 | 5·10 | 6·34 | 4·59 | 6·39 | 5·7 | 6·24 | 5·23 |
| 11 | 6·19 | 5·9 | 6·34 | 4·59 | 6·39 | 5·7 | 6·23 | 5·23 |
| 12 | 6·19 | 5·9 | 6·35 | 4·59 | 6·39 | 5·8 | 6·22 | 5·24 |
| 13 | 6·20 | 5·8 | 6·35 | 4·59 | 6·38 | 5·8 | 6·22 | 5·24 |
| 14 | 6·20 | 5·8 | 6·36 | 4·59 | 6·38 | 5·9 | 6·21 | 5·25 |
| 15 | 6·21 | 5·7 | 6·36 | 4·59 | 6·38 | 5·9 | 6·20 | 5·25 |
| 16 | 6·21 | 5·6 | 6·36 | 5·0 | 6·38 | 5·10 | 6·19 | 5·26 |
| 17 | 6·22 | 5·6 | 6·37 | 5·0 | 6·37 | 5·10 | 6·18 | 5·26 |
| 18 | 6·23 | 5·5 | 6·37 | 5·0 | 6·37 | 5·11 | 6·17 | 5·27 |
| 19 | 6·23 | 5·5 | 6·37 | 5·0 | 6·37 | 5·11 | 6·16 | 5·27 |
| 20 | 6·24 | 5·4 | 6·37 | 5·0 | 6·36 | 5·12 | 6·15 | 5·28 |
| 21 | 6·24 | 5·4 | 6·38 | 5·0 | 6·36 | 5·12 | 6·14 | 5·28 |
| 22 | 6·25 | 5·3 | 6·38 | 5·1 | 6·36 | 5·13 | 6·14 | 5·29 |
| 23 | 6·25 | 5·3 | 6·38 | 5·1 | 6·35 | 5·13 | 6·13 | 5·29 |
| 24 | 6·26 | 5·3 | 6·38 | 5·1 | 6·35 | 5·14 | 6·12 | 5·30 |
| 25 | 6·26 | 5·2 | 6·39 | 5·1 | 6·34 | 5·14 | 6·11 | 5·30 |
| 26 | 6·27 | 5·2 | 6·39 | 5·2 | 6·34 | 5·15 | 6·10 | 5·31 |
| 27 | 6·27 | 5·2 | 6·39 | 5·2 | 6·33 | 5·15 | 6·9 | 5·31 |
| 28 | 6·28 | 5·1 | 6·39 | 5·2 | 6·33 | 5·16 | 6·8 | 5·31 |
| 29 | 6·28 | 5·1 | 6·39 | 5·2 | 6·32 | 5·16 | 6·7 | 5·32 |
| 30 | 6·29 | 5·1 | 6·39 | 5·3 | 6·32 | 5·17 | 6·5 | 5·32 |
| 31 | 6·29 | 5·0 | ... | ... | 6·31 | 5·17 | 6·4 | 5·33 |

**PHASES OF THE MOON.**

| Date | Phase | H. | M. |
|---|---|---|---|
| 3 May | ☾ First Quarter | 4 | 29 p.m. |
| 10 " | ○ Full Moon | 7 | 31 a.m. |
| 17 " | ☽ Last Quarter | 8 | 12 " |
| 25 " | ● New Moon | 12 | 35 p.m. |
| 2 June | ☾ First Quarter | 12 | 3 a.m. |
| 8 " | ○ Full Moon | 3 | 18 p.m. |
| 16 " | ☽ Last Quarter | 12 | 20 a.m. |
| 24 " | ● New Moon | 1 | 33 " |
| 1 July | ☾ First Quarter | 5 | 24 a.m. |
| 8 " | ○ Full Moon | 12 | 0 " |
| 15 " | ☽ Last Quarter | 5 | 32 p.m. |
| 23 " | ● New Moon | 12 | 38 " |
| 30 " | ☾ First Quarter | 9 | 51 a.m. |
| 6 Aug. | ○ Full Moon | 10 | 41 a.m. |
| 14 " | ☽ Last Quarter | 10 | 56 " |
| 21 " | ● New Moon | 10 | 26 p.m. |
| 28 " | ☾ First Quarter | 2 | 52 " |

# General Notes.

## THE BOLL WORM AND THE "BOB WHITE" QUAIL.

"The Englishman" (Calcutta), commenting on Mr. Harcourt's endeavour to breed the "Bob White" quail in England, says:—" Mr. Lewis Harcourt, the Colonial Secretary, is conducting an interesting experiment at his home at Nuneham Park, Oxfordshire, with a view to keeping under, if not destroying, the boll weevil, the greatest pest of the cotton cultivator. In the United States the boll weevil has been kept in check by the 'Bob White' quail. Last summer Mr. Harcourt, by the courtesy of the American Zoological Society, obtained a number of these birds in the hope that they would breed at Nuneham, so that he might supply them to our cotton-growing colonies. Many previous attempts to introduce the bird into England have proved unsuccessful. Mr. Harcourt obtained the birds too late in the season for them to breed last year, but is hoping for results this year. The idea of breeding the 'Bob White' quail in England is Mr. Harcourt's own, and is being watched hopefully by all interested in cotton. The 'Bob White' is a wary denizen of open woods and pastures, and it has been successfully introduced into the West Indies."—"Rubber World."

[In reference to the above, we may observe that "boll worm" and the " boll weevil " are quite distinct. The latter is the pest which has caused such havoc in the United States. The boll-worm we have in Queensland. It is the same worm which attacks maize, but in neither case is it much in evidence, and in cotton fields it is easily got rid of by means of trap crops of maize interspersed with the cotton plants. Still, if the bird mentioned could be imported and acclimatised in Queensland, it might prove useful in the case of the boll worm in maize fields.—Editor " Q.A.J."]

## NATIVE BIRDS PROTECTION ACTS.

### DESTRUCTION OF NATIVE BIRDS.

Notwithstanding the many insect pests which damage or destroy crops of all descriptions, it seems impossible to impress upon the holiday-maker's mind that, were it not for insectivorous birds, these pests would increase to such an extent as to make the raising of field crops, vegetables, and fruit too expensive a business to be profitable. Even a gun tax, to include the mischievous pea-rifle, would be powerless to protect the birds, in consequence of the practical impossibility of enforcing it in country districts. Whilst the legitimate sportsman carefully observes the close season for game birds, the boy with the pea-rifle is troubled with no conscientious scruples on that score. He looks upon every member of the feathered tribe which comes within reach of his weapon as the legitimate object of his nefarious sport. If the attention of these shooters were directed only towards the fruit or leaf eating birds, no objection could be raised towards their sacrificing

thousands of them. Unfortunately, they cannot discriminate between useful and destructive birds; and who is there to teach them? If every State and private school were supplied with well-executed coloured plates of both classes, the teachers would be able to do a great deal towards minimising the evil. We proposed at one time to issue with every Journal one or two such coloured plates, but, unfortunately, these are expensive, and the times have of late been too bad to enable us to carry out the idea. But we shall by no means lose sight of it. Take a few of our insectivorous birds, such as crows, ibis, curlews, owls, night-jars (otherwise morepork), &c. The crow is generally cunning enough to distinguish between a stick and a gun, and less frequently falls a victim to the gunner. Crows, although they are notorious for destroying chickens, young birds, hares, &c., yet render signal service to the farmer by destroying mice, cutworms, wireworms, &c. It has been calculated in Germany by Herr Körig that "a field mouse and its progeny will destroy 1,000 plants of grain whilst the latter are developing." We know what tremendous losses the plague of mice inflicted on farmers last year. He also stated that "About 3,000 crows, by destroying mice and other vermin, benefit farmers to the amount of £2,500 per annum. In other words, what is commonly but erroneously known as the carrion crow benefits him to the amount of 11d. per bird per annum over and above the loss it causes him by the destruction of chickens, eggs, &c." Anyone who has watched the flocks of ibis on newly-ploughed land, thrusting their long curved bills deep into the soil, and devouring thousands of worms, grubs, beetles, and larvæ, must be impressed with the great value of these birds; yet how often are they shot in mere wantonness and left to rot on the ground? The number of mice consumed by owls is something incredible.

In 1905 we were indebted to Mr. Hy. Tryon, Government Entomologist and Vegetable Pathologist, for the following information on the food of various birds. He has closely studied their habits and examined their stomachs. This scientific phase of the question we do not attempt to deal with; the object of this article is to draw attention to the indiscriminate shooting of birds, destructive or useful, for no other purpose but sport, or "to keep one's hand in," as swallow and marten shooters express it: —

## INSECTIVOROUS AND PARTLY INSECTIVOROUS BIRDS.

*Ibis.*—The food of the birds comprised by this name consists of frogs, especially in the tadpole state, grasshoppers, grass-eating caterpillars, ground-frequenting caterpillars, soil-frequenting "grubs" generally, young fish, &c.

*Carrion Crow.*—No bird in Australia bears this name that may be erroneously bestowed on the common crow or raven, or on the white-eyed crow, both of which possess feeding habits distinct from those of the European "carrion crow." The food of the bird of coastal Queensland, the former of the two kinds mentioned, includes grasshoppers, locusts, cicadas, moths, grass-eating caterpillars, soil-frequenting grubs, and large insects generally. Ticks, rats and mice, eggs of poultry and

wild birds, young chickens and ducks (exceptionally); seeds of cereals when broadcasted, plantlets of cereals, maize from the cob (exceptionally), lambs, the eyes of cast ewes and of bogged sheep and cattle; fruit, *e.g.*, pineapples and watermelons; carrion and offal generally.

*Pied Crow* (*Shrike*).—Insects of various kinds, especially the larger ones—*e.g.*, grasshoppers, locusts, &c.; seeds, berries of wild and cultivated trees, coffee berries, fruit generally—oranges, figs, grapes, strawberries, to most kinds of which it is highly destructive; carrion, including dead birds, &c.

*Morepork* (Ninix).—The smaller kinds feed on various nocturnal insects, on rodents, on small birds, on young domesticated pigeons. The largest kinds the same, and on birds as large as a laughing jackass—*Dacelo sp.* (Brennan).

*Night-jar.*—On various nocturnal flying insects, and especially on moths.

*Laughing Jackass.*—On large insects, grasshoppers, locusts, &c., lizards, iguanas (small), snakes, small rodents (rats and mice), chickens, young birds.

*Kingfishers* (1. *Halcyon*).—Feed on grasshoppers, mantidæ, noctuid caterpillars, lizards (small), tree frogs, spiders, tipulid flies, beetles, white-ants.

*Kingfishers* (2. *Alcyone*).—Small fish, aquatic insects, flying insects hovering over water.

*Butcher Birds* (*Cracticus spp.*).—Feed on large insects (grasshoppers, &c.), small lizards and other reptiles, small snakes, caterpillars, soil-frequenting "grubs," small rodents (mice, &c.), nestling birds, small birds both wild and domesticated, very young chicken, hive bees (exceptionally).

*Dollar Birds.*—Insects (especially beetles) occurring on the wing and in tree-tops; hive bees (exceptionally).

The whole of the State is now under the operation of the Acts, and Queensland is divided into two districts, for which two distinct close seasons are provided. New names have been included in the lists of protected birds. Schedule A contains the names of those totally protected, while in Schedule B will be found those to which partial protection only is afforded. Considering the valuable asset insectivorous birds are to the State, and especially to those people whose occupation is connected with the land, there should be ready assistance given to the Department in the protection of our native birds. It should be noted that any person can prosecute under the Acts.

Reserves can be proclaimed with the consent of the owner or occupier of private lands, and rangers (honorary) appointed when a reserve has been created.

The following particulars showing the birds which are subject to the operation of the Native Birds Protection Acts, the periods of the year during which the Acts are in operation, and the reserves set apart for the preservation and protection of such birds are published for general information.

# BIRDS ABSOLUTELY PROTECTED THROUGHOUT QUEENSLAND.

## SCHEDULE A.

| Common Name. | Technical Designation. |
|---|---|
| Australian Bee-eaters ... ... ... ... | Merops |
| Babblers ... ... ... ... ... ... | Timeliidæ |
| Bell Birds ... ... ... ... ... ... | Oreoica |
| Bitterns .. ... ... ... ... ... | Ardeiformes |
| Black Cockatoos of all species ... ... | Calyptorhynchus |
| Black Swans ...... ... .. ... ... | Anatidæ |
| Bower Birds of all species ... ... ... | Ptilonorhynchidæ |
| Bush Chats of all species ... ... ... | Ephthianurinæ |
| Cassowaries ... ... ... ... ... ... | Casuariidæ |
| Caterpillar-eaters ... ... ... ... ... | Campophagidæ |
| Coachwhip Birds ... ... ... ... ... | Timeliidæ |
| Coucals or Swamp Pheasants ... ... ... | Centropodinæ |
| Cuckoo Shrikes ... ... ... ... ... | Campophagidæ |
| Cuckoos of all species ... ... ... ... | Cuculidæ |
| Diamond Birds (Pardalotes) ... ... ... | Dicæidæ |
| Dollar Birds (Rollers) ... ... ... ... | Eurystomus |
| Egrets of all species ... ... ... ... | Ardeiformes |
| Fantails ... ... ... ... ... ... | Muscicapidæ |
| Field Wrens ... ... ... ... ... | Timeliidæ |
| Flower-peckers ... ... ... ... ... | Dicæidæ |
| Fly-catchers (Wagtails) ... ... ... ... | Muscicapidæ |
| Fly-eaters ... ... ... ... ... ... | Muscicapidæ |
| Frogmouths ... ... ... ... ... | Podargidæ |
| Grebes ... ... ... ... ... ... | Podicipediæ |
| Herons ... ... ... ... ... ... | Ardeiformes |
| Honey-eaters (except Miners, Wattle Birds, Friar Birds) | Meliphagidæ |
| Ibises ... ... ... ... ... ... | Ardeiformes |
| Jabirus ... ... ... ... ... ... | Ardeiformes |
| Kingfishers (all species) ... ... ... ... | Alcedinidæ |
| Kites ... ... ... ... ... ... | Elanus |
| Land Curlews or Stone Plovers ... ... | Œdicnemidæ |
| Larks of all species ... ... ... ... | Motacillidæ Alaudidæ |
| Laughing Jackasses ... ... ... ... | Alcedinidæ |
| Lyre Birds ... ... ... ... ... ... | Menuridæ |
| Magpies ... ... ... ... ... ... | Gymnorhina |
| Magpie Larks ... ... ... ... ... | Grallina |
| Martins ... ... ... ... ... ... | Hirundinidæ |
| Nightjars or Goat-suckers ... ... . | Caprimulgidæ |
| Nut-hatches or Tree-runners (Woodpeckers) | Sittidæ |
| Owls ... ... ... ... ... ... | Strigidæ |
| Parras ... ... ... ... ... ... | Parridæ, Glareolidæ |
| Parrots (Ground or Swamp) ... ... ... | Pezoporus |
| Pipits ... ... ... ... ... ... | Motacillidæ Alaudidæ |
| Pittas of all species ... ... ... ... | Pittidæ |
| Pratincoles ... ... ... ... ... ... | Parridæ, Glareolidæ |
| Regent Birds ... ... ... ... ... | Genus Sericulus (Ptilonorhynchidæ) |
| Rifle Birds ... ... ... ... ... ... | Paradiseidæ |
| Robins of all species ... ... ... ... | Muscicapidæ |
| Satin Birds ... ... ... ... ... ... | Genus Ptilonorhynchus (Ptilonorhynchidæ) |
| Shining Starlings (Calornis) ... ... | Eulabetidæ |
| Shrike Tits ... ... ... ... ... ... | Muscicapidæ |
| Song Larks ... ... ... ... ... | Timeliidæ |
| Spoonbills ... ... ... ... ... ... | Ardeiformes |
| Storks ... ... ... ... ... ... | Ardeiformes |
| Swallows ... ... ... ... ... ... | Hirundinidæ |
| Swamp Pheasants ... ... ... ... ... | Centropodinæ |
| Swifts ... ... ... ... ... ... | Cypselidæ |
| Thickheads (Whistlers) ... ... ... ... | Muscicapidæ |
| Thrushes of all species ... ... ... ... | Turdidæ, Prionopidæ |
| Tit Warblers (Tree Tits) ... ... ... ... | Sylviidæ |
| Tree-creepers ... ... ... ... ... | Climacteris |
| Tree-runners ... ... ... ... ... | Sittidæ |
| Warblers ... ... ... ... ... ... | Sylviidæ |
| White-eyes or Silver-eyes ... ... ... | Zosteropidæ |
| Wood Swallows ... ... ... ... ... | Artamidæ |
| Wren Warblers ... ... ... ... ... | Sylviidæ |
| Wrens of all species ... ... ... ... | Sylviidæ |

# BIRDS PARTIALLY PROTECTED THROUGHOUT QUEENSLAND.

## SCHEDULE B.

| Common Name. | Technical Designation. |
|---|---|
| Bronzewing Pigeons ... ... ... ... | Columbæ |
| Brown Hawks ... ... ... ... ... | Falconidæ |
| Bustards or Plain Turkeys ... ... ... | Otididæ |
| Coots ... ... ... ... ... ... | Rallidæ |
| Cranes ... ... ... ... ... ... | Gruidæ |
| Crakes ... ... ... ... ... ... | Rallidæ |
| Curlows ... ... ... ... ... ... | Charadriidæ |
| Dottrels ... ... ... ... ... ... | Charadriidæ |
| Doves ... ... ... ... ... ... | Columbæ |
| Ducks, Wild, of all species ... ... ... | Anatidæ (excepting Black Swans) |
| Emus ... ... ... ... ... ... ... | Dromæidæ |
| Fig Birds ... ... ... ... ... ... | Oriolidæ |
| Finches (including Plum-headed, Banded, Painted, Zebra, and Redheaded Finches, &c.) | Ploceidæ |
| Geese, Wild ... ... ... ... ... ... | Anatidæ (excepting Black Swans) |
| Land Rails ... ... ... ... ... ... | Rallidæ |
| Mallee Fowls ... ... ... ... ... | Megapodiidæ |
| Moor Hens ... ... ... ... ... | Rallidæ |
| Native Companions ... ... ... ... | Gruidæ |
| Native Hens ... ... ... ... ... | Rallidæ |
| Orioles ... ... ... ... ... ... | Oriolidæ |
| Pigeons, all Wild ... ... ... ... | Columbæ |
| Plovers ... ... ... ... ... ... | Charadriidæ |
| Quails ... ... ... ... ... ... | Phasianidæ, Turnicidæ |
| Rails, Land and Water ... ... ... ... | Rallidæ |
| Scrub or Brush Turkeys ... ... ... | Megapodiidæ |
| Scrub Fowls ... ... ... ... ... | Megapodiidæ |
| Sea Birds, all ... ... ... ... ... | |
| Turkeys, Plain and Scrub or Brush... ... | Otididæ and Megapodiidæ |
| Waders ... ... ... ... ... ... | Charadriidæ |
| Water Rails ... ... ... ... ... ... | Rallidæ |

### *Close Seasons.*

In District No. 1, from the first day of September in each year to the thirty-first day of March in the following year, inclusive.

In District No. 2, from the first day of November in each year to the thirty-first day of May in the following year, inclusive.

(With the exception of emus on prickly-pear infested lands, where the close season shall be from the first to the seventh day of July in each year.)

For districts, *see* map.

### PENALTIES.

If any person shall wilfully kill or destroy any protected native bird, or shall use any instrument whatever, net, or other means for the purpose of killing or destroying any native birds, within the periods hereinbefore mentioned, such person shall, upon conviction, pay a fine of not less than one pound or more than five pounds.

If any person shall buy, sell, or knowingly have in his possession, house, or control any native bird at any time within the period herein-before mentioned, he shall pay a penalty not less than one pound or more than five pounds for every bird.

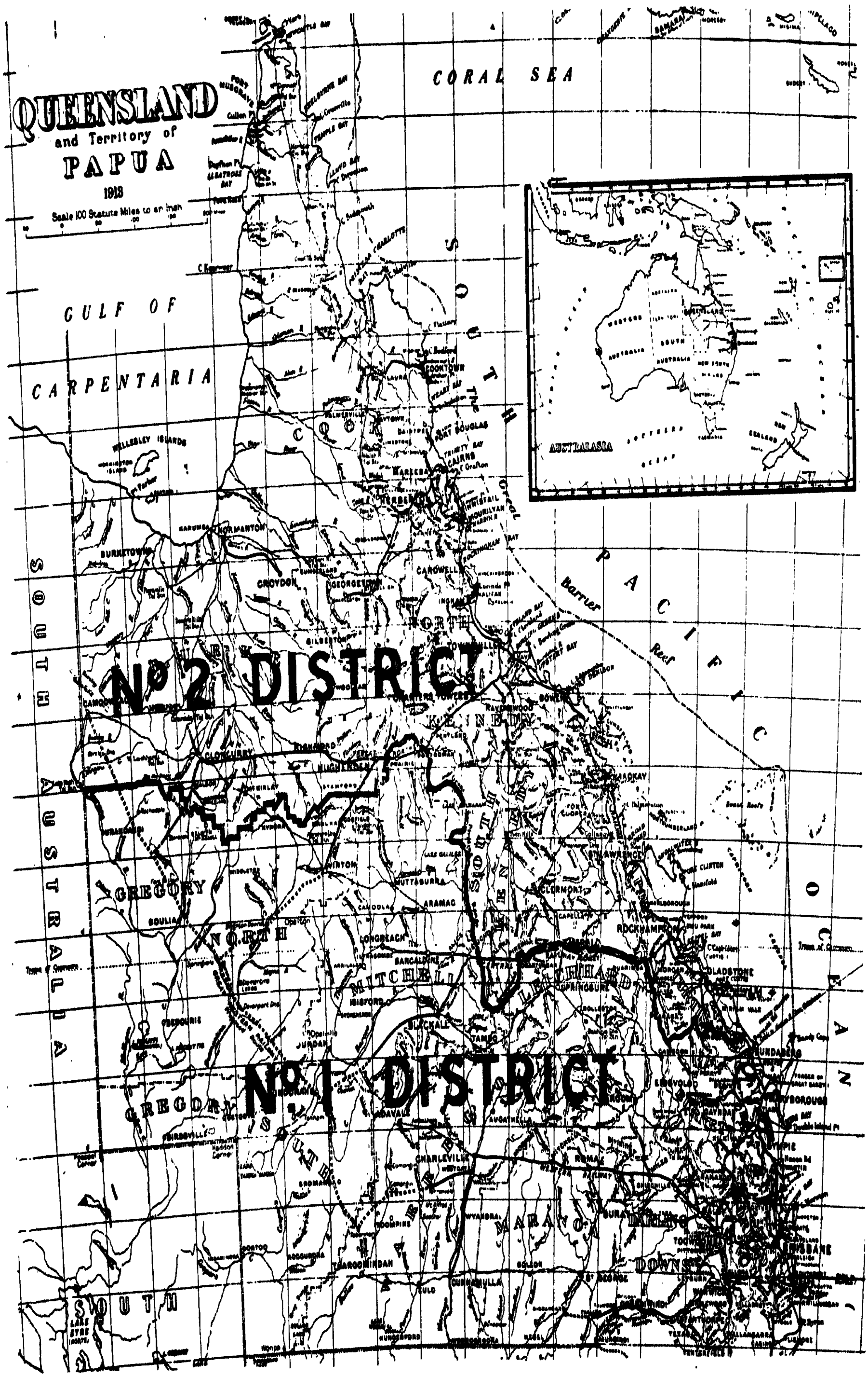
If any person wilfully kills, destroys, or captures any native bird, or uses any instrument, net, or any other means whatever for the purpose of killing, destroying, or capturing any such bird, while it is within or flying over a reserve, he shall be liable upon conviction to pay a fine of not less than one pound or more than five pounds.

A moiety of every penalty recovered under the Act shall be paid to the person or persons laying the information.

# LIST OF RESERVES WITHIN WHICH THE DESTRUCTION OF NATIVE BIRDS IS PROHIBITED DURING THE WHOLE YEAR.

| Situation of Reserve. | For Proclamation and Boundaries see *Government Gazette*. Date. | Part. | Page. |
|---|---|---|---|
| Parish of Enoggera, county of Stanley (Enoggera Reservoir and Catchment Area) | 29 Aug., 1885 | II. | 769 |
| Parish of Gracemere, county of Livingstone ... ... | 29 Aug., 1885 | II. | 769 |
| Parishes of Toorbul, Beerwah, and Bribie, county of Canning (Pumice Stone Channel and the shores thereof) | 12 Sept., 1885 | II. | 897 |
| **Parishes of Crow's Nest and Douglas, counties of Cavendish and Aubigny* | 10 Oct., 1885 | II. | 1253 |
| **Parish of Emu Creek, county of Cavendish* ... ... | | | |
| **Parish of Douglas, county of Aubigny* ... ... ... | | | |
| Parish of Nerang, county of Ward, Southport ... ... | 5 June, 1886 | I. | 1946 |
| Parishes of Moggill and Indooroopilly, county of Stanley (Gold Creek and Moggill Creek Drainage Areas)) | 13 July, 1889 | II. | 797 |
| Parish of Boonara, county of Mackenzie (on the leased part of Boonara Run) | 14 Sep., 1889 | III. | 99 |
| Parishes of Enoggera and Indooroopilly, county of Stanley (Mount Coot-tha Reserve) | 20 Dec., 1890 | III. | 1403 |
| Parish of Oxley, county of Stanley (Chelmer Recreation and Water Reserve) | 4 Mar., 1893 | I. | 670 |
| Parish of Hewittville, county of Livingstone (Reserve for Water, Emu Park) | 18 July, 1893 | II. | 583 |
| Parish of Ossa, county of Carlisle, Seaforth ... ... | 1 Jan., 1898 | I. | 21 |
| Parishes of Cressbrook, Bowman, and Neara, county of Canning | 11 June, 1898 | I. | 1596 |
| Lake Clarendon ... ... ... ... ... ... ... ... | 24 Mar., 1900 | I. | 961 |
| England and Clarendon ... ... ... ... ... | 25 June, 1900 | I. | 1650 |
| Fitzroy, Nicholson, Faraday, Calioran ... ... ... | 6 July, 1901 | II. | 564 |
| Gavial and Gracemere (The Duck Pond) ... ... ... | 13 July, 1901 | II. | 633 |
| Horseshoe Lagoon, parish of Selkirk ... ... ... | 16 Aug., 1902 | II. | 421 |
| Cloyna ... ... ... ... ... ... ... ... ... ... | 28 Dec., 1901 | III. | 990 |
| Parishes of Antill and Jarvisfield ... ... ... ... | 30 July, 1904 | II. | 249 |
| Parish of Jarvisfield (Church Lagoon) ... ... ... | | | |
| Ditto (Red Lily Lagoon) ... ... | | | |
| Parish of Rockhampton (Murray's and Jardine's Lagoons) | 27 Aug., 1904 | II. | 493 |
| Parish of Charters Towers (Burdekin Weir) ... ... | 29 Oct., 1904 | II. | 901 |
| Dunk, Kumboola Island, and Mount Islet, the Family Islands (comprising Thorpe, Richards, Wheeler, Coombe, Bowden, Smith, and Hodson Islands), and Brooke Islands | 13 May, 1905 | I. | 1546 |
| Parish of Yeerongpilly (Russell Wilkins) ... ... | 16 Dec., 1905 | II. | 1273 |
| Ditto (Water Reserve) ... ... | | | |
| Parish of Enoggera (Private lands on Toowong Creek) | 11 Aug., 1906 | II. | 274 |
| Parish of Yaamba (P. F. MacDonald's property) ... | 8 Sep., 1906 | II. | 514 |
| Parish of Noogoon (Mud Island) ... ... ... ... | 8 Dec., 1906 | II. | 1195 |
| Parish of Broadmere (Lake Murphy) ... ... ... | 13 Feb., 1909 | I. | 341 |
| County of Stanley (The Redcliffe Shire) ... ... ... | 20 Mar., 1909 | I. | 738 |
| Parishes of Wyseby and Aubrey (Stud Farm for Breeding Police Horses) | 10 July, 1909 | II. | 70 |
| Parish of Pentland (Pentland Dam and Swamp) ... ... | 24 July, 1909 | II. | 220 |
| Parish of Dugandan (A. J. McConnell's property) ... | 4 Sep., 1909 | II. | 587 |
| County of Nares (The Douglas Shire) ... ... ... | 16 April, 1910 | I. | 1002 |
| County of Elphinstone (Abattoir Reserve, Townsville)... | 21 May, 1910 | I. | 1326 |
| Parish of Taylor, Toowoomba District (Jubilee Park, Redwood Park, Picnic Point, and One-tree Hill) | 8 Oct., 1910 | II. | 1010 |
| Parish of Tingalpa (Shire of Wynnum) ... ... ... | 18 Feb., 1911 | I. | 930 |
| Gladstone Land Agent's District (Capricorn Group of Islands | 5 Aug., 1911 | II. | 422 |
| Mackay Land Agent's District (Orphanage Swamp and Denman's Water Hole) | 23 Sep., 1911 | II. | 820 |
| Parishes of Rockybar and Eumara (Reeves Lake, &c., on Eumara and Gainsford Holdings) | 29 June, 1912 | I. | 1711 |
| Shire of Widgee ... ... ... ... ... ... ... ... | 20 Dec., 1913 | II. | 1741 |
| Parish of Stradbroke (Myora) ... ... ... ... ... | 11 April, 1914 | I. | 1036 |
| Shire of Maroochy ... ... ... ... ... ... | 2 May, 1914 | I. | 1173 |
| County Ward, area on coast from Southport to Pt. Danger | 4 July, 1914 | II. | 38 |

* Note.—These reserves are for the protection of the following birds only:—Tallegallas or Scrub Turkeys, Bronzewing and all Wild Pigeons, Emus, Regent Birds, and Quails.


QUEENSLAND
and Territory of
PAPUA
1918
Scale 100 Statute Miles to an Inch
CORAL SEA
GULF OF
CARPENTARIA
AUSTRALASIA
SOUTH
PACIFIC
OCEAN
The Great Barrier Reef
SOUTH AUSTRALIA
Nº 2 DISTRICT
Nº 1 DISTRICT
COOK
NORTH KENNEDY
SOUTH KENNEDY
GREGORY
NORTH GREGORY
SOUTH GREGORY
MITCHELL
LEICHHARDT
WARREGO
MARANOA
DARLING DOWNS
COOKTOWN
CAIRNS
NORMANTON
BURKETOWN
CROYDON
GEORGETOWN
CLONCURRY
HUGHENDEN
WINTON
CHARTERS TOWERS
TOWNSVILLE
BOWEN
MACKAY
CLERMONT
ROCKHAMPTON
GLADSTONE
BUNDABERG
LONGREACH
BARCALDINE
ARAMAC
CHARLEVILLE
ROMA
TOOWOOMBA
BRISBANE
CUNNAMULLA
BOULIA
BIRDSVILLE
THARGOMINDAH
HUNGERFORD
SOUTH

## POTATO-DIGGING.

Mr. W. Dowie, of Trafalgar, Vic., claims to have put up a world's record by digging and bagging 60 bags of potatoes in eight hours (says an exchange). Thos. Malady, the holder of the previous record, has challenged him to engage in a potato digging match for £25 a side, and others are eager to compete. Malady's record was made in 1910, at Trafalgar, when he essayed to beat a Bungaree record of 48 bags in a day. The crop he was working on was the American Freeman, yielding about 12 tons to the acre, and the crops were thick. In nine hours he dug and bagged 60 bags.

[One would think that in a crop of 12 tons to the acre, it would have been advantageous to employ a potato-digging machine.—Ed. "Q.A.J."]

## A NEW METHOD OF PREPARING SEEDS FOR MAILING.

The many unsuccessful attempts to import seeds of the mangosteen, in good condition for germinating, into Queensland and elsewhere, almost gave rise to the idea that it was impossible to introduce the fruit into this State. Still success was attained in a few cases after many failures, and this delicious fruit has been grown and has fruited at the Kamerunga State Nursery, near Cairns, also at Port Douglas, and we believe that one or two trees are to be found on the Lower Burdekin, near Ayr, but it is doubtful if the latter are of the true edible variety.

In the June issue of the "Philippine Review," the following important announcement was made by M. E. D. Merrill, botanist of the Bureau of Science, Manila. From this it would seem that the seed of the mangosteen can be so prepared as to be capable of standing a long journey, while retaining its full vitality: —

"Everybody conversant with the subject is well aware that the rapid loss of the viability of certain seeds of tropical fruits, such as the durian, the avocado, the mangosteen, marang, or the lanson, is due in a large measure to the invasion of fungi, and when these are excluded, provided that the seeds are otherwise properly packed in a medium of the right degree of moisture, there is really no sound reason why such seeds should not be successfully transported long distances, and retain their viability for a very considerable period.

"Mr. E. D. Merrill, botanist of the Bureau of Science, who has recently returned from a journey to Java and Singapore, related to the writer that he saw in the Singapore botanical garden mangosteen plants grown from seed that were shipped from Singapore to New York, United States of America, and from thence returned to Singapore, after which they were planted and gave a germination of 50 per cent. These seeds were washed in a weak solution of carbolic acid and then packed in moist charcoal that had been disinfected with carbolic acid. Over three months elapsed between the time of the disinfection and packing of the seed and the planting.

"The above experiment was carried out by Mr. I. H. Burkhill, director of the botanical garden in Singapore."

## DISTRICT EXHIBITS AT THE WONDAI SHOW.

The accompanying illustration gives an excellent idea of the Mondure District Exhibit which took First Prize at the last Wondai Show. The exhibit was very favourably commented on by the judge, Mr. Butt, of Messrs. Denham Brothers.

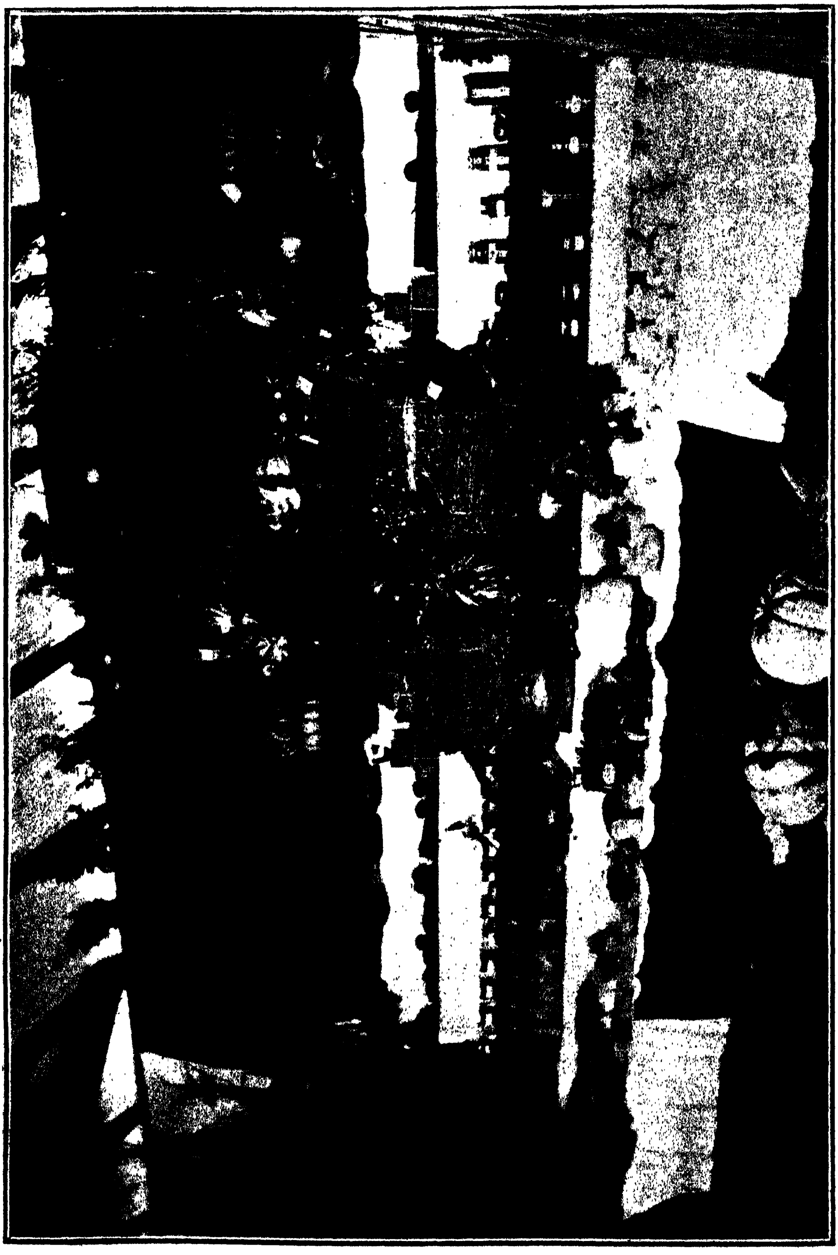


PLATE 53.—WONDAI SHOW. MONDURE DISTRICT EXHIBIT WHICH OBTAINED THE FIRST PRIZE.

## THE GREAT AUSTRALIAN ARTESIAN BASIN.

Although there are some artesian wells outside this area, yet, in speaking of the "Great Australian Artesian Basin," writes Mr. G. H. Knibbs, in the Official Year Book in the Commonwealth of Australia, the area is understood which includes (*a*) considerably more than one-half of Queensland, taking in practically all the State lying west of the Great Dividing Range, with the exception of an area in the north-west contiguous to the Northern Territory; (*b*) a considerable strip of New South Wales along its northern boundary and west of the Great Dividing Range; and (*c*) the north-eastern part of South Australia proper, together with the extreme south-eastern corner of the Northern Territory. The basin is said to be the largest yet discovered, and is about 569,000 square miles, of which 376,000 square miles are in Queensland, 110,000 square miles in South Australia, and 83,000 square miles in New South Wales. The area of the intake beds is estimated at 60,010 square miles—viz., 50,000 square miles in Queensland, and 10,010 square miles in New South Wales. It is estimated that at present there are about 1,760 bores tapping the basin in the three States. The deepest well was one known as Bimerah Run No. 3, Whitewood, lying between the Barcoo and Thomson Rivers; this had a depth of 5,045 ft., and was stated to yield 70,000 gallons daily. This flow is, of course, a comparatively small one, many wells yielding, when uncontrolled, from one to three million gallons a day. A well at Cunnamulla, Coongoola Bore, is stated to have a daily flow, when uncontrolled, of no less than 4,500,000 gallons.

The Queensland Artesian Bores on 30th June, 1911, totalled 1,133, and the daily flow amounted to 516,591,200 gallons. In 1913, the number of Artesian Bores in the State was 2,065, the total daily flow being 529,807,360 gallons.

# Answers to Correspondents.

## CATTLE DIP.

H. S. DOUGLAS, Harvest Home—

For 20 gallons of water dissolve ½ lb. of arsenic by the aid of ¼ lb. caustic soda. But the Agricultural Chemist recommends the purchase of ready-prepared concentrates, such as Queensland Cattle Dip or Royal Cattle Dip, as they are more effective than a pure solution of arsenic. We would suggest to our correspondent that, at any future time, he give us his address.

## KAINIT.

C. SPEER, Hemmant—

Kainit is a crystallised mixture of potassium sulphate, magnesium sulphate, magnesium chloride, and water. It is a potassic manure only suitable for certain crops, and can be obtained from the Potash Syndicate, Sydney.

*Manure for Pineapples and Strawberries.*

The following fertiliser mixture may be used with advantage for Pineapples:—5 cwt. meatworks manure (blood and bones); 3 cwt. Thomas phosphate; 3 cwt. sulphate of potash; 1 cwt. dried blood or nitrate of lime per acre.

For Strawberries, a useful mixture is:—3 to 5 cwt. superphosphate; 1½ to 2 cwt. sulphate of potash; 1 to 1½ cwt. sulphate of ammonia or nitrolim per acre. Or, 1 cwt. fine bonemeal; 4 cwt. superphosphate; 2 cwt. sulphate of potash; 1½ cwt. nitrolim per acre.

# The Markets.

## PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JULY, 1914.

| Article. | | JULY. Prices. |
|---|---|---|
| Bacon | lb. | 8d. to 9½d. |
| Bran | ton | £5 17s. 6d. |
| Butter | cwt. | 116s. to 120s. |
| Chaff, Mixed | ton | £6 to £6 10s. |
| Chaff, Oaten (Victorian) | „ | £5 10s. to £5 15s. |
| Chaff, Lucerne | „ | £6 5s. to £6 17s. 6d. |
| Chaff, Wheaten | „ | £3 6s. |
| Cheese | lb. | 8¼d. to 8½d. |
| Flour | ton | £9 |
| Hams | lb. | 1s. 2d. |
| Hay, Oaten (Victorian) | ton | £6 to £6 10s. |
| Hay, Lucerne (Prime) | „ | £3 10 to £4 15s. |
| Honey | lb. | 2¼d. to 2¾d. |
| Maize | bush. | 3s. 3½d. to 3s. 6d. |
| Oats | „ | 3s. 6d. to 3s. 8d. |
| Onions | ton | £8 10s. |
| Peanuts | lb. | 2½d. to 3d. |
| Pollard | ton | £6. |
| Potatoes | „ | £7 to £8 10s. |
| Potatoes (Sweet) | cwt. | 2s. to 2s. 8d. |
| Pumpkins | ton | £1 to £1 5s. |
| Wheat, Milling | bush. | 3s. 11d. to 4s. 1d. |
| Eggs | doz. | 10d. to 1s. 1d. |
| Fowls | pair | 3s. 6d. to 4s. 6d. |
| Geese | „ | 6s. 6d. |
| Ducks, English | „ | 3s. 6d. to 4s. |
| Ducks, Muscovy | „ | 4s. 6d. to 6s. |
| Turkeys (Hens) | „ | 7s. 6d. to 8s. 6d. |
| Turkeys (Gobblers) | „ | 14s. 6d. to 17s. |

## SOUTHERN FRUIT MARKETS.

| Article. | JULY. Prices. |
|---|---|
| Bananas (Queensland), sugar, per case | 13s. |
| Bananas, G.M., per case | 18s. 6d. to 19s. |
| Bananas (Fiji), per case | 17s. to 18s. |
| Custard Apples, per case | 6s. to 7s. |
| Lemons, per case | ... |
| Mandarins (Queensland), per case | 7s. to 9s. |
| Oranges (Navel), per case | 9s. to 10s. |
| Oranges (other), per case | 7s. to 8s. |
| Papaw Apples, per quarter-case | . |
| Passion Fruit, per half-case | 5s. to 7s. |
| Pineapples (Queensland), (Queens), per case | 8s. to 9s. |
| Pineapples (Ripleys), per case | 7s. to 8s. |
| Pineapples (commons), per case | 6s. to 7s. |
| Strawberries | ... |
| Tomatoes, per quarter-case | 3s. 6d. to 4s. 6d. |

## PRICES OF FRUIT—TURBOT STREET MARKETS.

| Article. | JULY. Prices. |
|---|---|
| Apples, Eating (Tasmanian), per case | 8s. to 9s. |
| Apples (Cooking), per case | 5s. to 7s. |
| Bananas (Cavendish), per dozen | 3d. to 4½d. |
| Bananas (Sugar), per dozen | 1½d. to 2d. |
| Cape Gooseberries, per quarter-case | 7s. to 10s. |
| Citrons, per cwt. | 10s. 6d. |
| Cocoanuts, per sack | 12s. to 14s. |
| Cumquats, per quarter-case | 2s. 6d. to 3s. 3d. |
| Custard Apples, per quarter-case | 3s. to 4s. 6d. |
| Lemons (Local), per case | 4s. to 7s. |
| Mandarins, per case | 5s. to 8s. 6d. |
| Oranges (Navel), per case | 8s. |
| Oranges (other), per case | 3s. 6d. to 6s. 9d. |
| Papaw Apples, per quarter-case | 1s. 6d. to 3s. 6d. |
| Passion Fruit, per quarter-case | 6s. 6d. to 7s. 6d. |
| Peanuts, per pound | 2½d. to 3d. |
| Pineapples (Ripley), per dozen | 2s. to 3s. |
| Pineapples (Rough), per dozen | 6d. to 1s. 6d. |
| Pineapples (Smooth), per dozen | 1s. 6d. to 4s. |
| Rosellas, per sugar bag | 3s. 6d. to 5s. |
| Strawberries, per dozen pint boxes | 5s. to 10s. |
| Strawberries, per tray | 2s. to 2s. 6d. |
| Tomatoes, per quarter-case | 1s. to 3s. |

## TOP PRICES, ENOGGERA YARDS, JUNE, 1914.

| Animal. | JUNE. Prices. |
|---|---|
| Bullocks | £11 5s. to £12 7s. 6d. |
| Cows | £7 17s. 6d. to £9 5s. |
| Merino Wethers | 27s. 6d. |
| Crossbred Wethers | 27s. |
| Merino Ewes | 18s. 6d. |
| Crossbred Ewes | 20s. 3d. |
| Lambs | 21s. |
| Pigs (Porkers) | ... |

# Farm and Garden Notes for September.

FIELD.—Spring has now arrived, and with it there will be the usual trouble with weeds, especially on carelessly prepared ground. Therefore, the cultivator and the horse and hand hoe must be kept vigorously at work to check the weed pests and save the growing crops as well as much future labour. Attend to earthing up any crop which may require it. There may possibly occur drying winds, dry weather, and even very late frosts, which have not been unknown in parts of this State even as late as September. Still, good showers may be looked for in October, and much useful work may be done during the present month which will go far to afford a fair prospect of a good return for labour. Plant out *Agave rigida*, var. Sisalana (sisal hemp plant), in rows 6 by 8 ft. apart, according to the richness of the soil. All dry places on the farm, too rocky or too poor for any ordinary crops, should be planted with this valuable aloe. Especially should limestone country be selected for the purpose. If the soil is very poor, and the plants very small, it is better to put the latter out into a nursery of good soil, about 1 ft. apart. Next year they will be good-sized plants. Keep down tall weeds in the plantation, and do not allow couch or buffalo grass to grow about the roots. Sisal will do no good if planted on low-lying wet land, or on a pure sandy soil. It thrives best where there is plenty of lime, potash, and phosphoric acid, all of which can be cheaply supplied if wanting in the soil. Sisal requires so little labour from planting to maturity that it can be grown to good profit despite the high cost of white labour. Sow cotton—Sea Island near the coast, and Uplands generally. Caravonica succeeds best in North Queensland. Sow maize, sorghum, imphee, mazzagua, Indian cane, prairie grass, Rhodes grass and paspalum, panicum, tobacco, pumpkins and melons. Sugar-cane planting should be vigorously carried on. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, ginger and canaigre, the latter a tuber yielding a valuable tanning substance. Plant out coffee.

KITCHEN GARDEN.—Now is the time when the kitchen garden will richly repair all the labour bestowed upon it, for it is the month for sowing many kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost. Failing a sufficient supply of these, artificials may be used with good results. Dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and in the latter case, stir the soil early next day to prevent caking. Mulching with straw, leaves, or litter will be of great benefit as the season becomes hotter. It is a good thing to apply a little salt to newly dug beds. What the action of salt is, is not exactly known, but when it is applied as a top dressing, it tends to check rank growth. A little is excellent for cabbages, and especially for asparagus, but too much renders the soil sterile, and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean

delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart, and 18 in. between the plants, and the climbing sorts, 6 ft. each way. Sow Guada bean, providing a trellis for it to climb on later. Sow cucumbers, melons, marrows and squash at once. If they are troubled by the red beetle, spray with Paris green or London purple. In cool districts, peas and even some beetroot may be sown. Set out egg plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem, either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, eschalots, cabbage, radishes, kohl-rabi, &c. These will all prove satisfactory, provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

FLOWER GARDEN.—Continue to plant bulbs as directed last month. Protect the plants as much as possible from cold westerly winds, which may still occur, notwithstanding the increasing temperature. Be careful that the bulbs do not come in contact with fresh manure. Keep a good look out for slugs. Plant out chrysanthemums, palms, and all kinds of tropical and semi-tropical plants. If hot weather should ensue after planting, water and shade must be given. Sow dianthus, snapdragon, and coleus, seed or cuttings of the latter. Roses will now be in full bloom. Keep them free from aphis, and cut off all spent blooms. This latter work should be done in the case of all flowers. If you wish to save seeds, do not wait for the very last blooms, but allow some of the very best to go to seed. If you have any toads in the garden or bush-house, encourage them to take up their abode there. They are perfectly harmless, in spite of their ugliness, and they destroy an astonishing number of insects injurious to plants. Fill up all vacancies with herbaceous plants. Sow zinnia, gaillardia, amaranthus, cockscomb, balsam, sunflower, marigold, cosmos, summer chrysanthemum, coreopsis, portulaca, mesembryanthemum, calendula, &c.

# Orchard Notes for September.

## THE SOUTHERN COAST DISTRICTS.

The marketing of citrus fruits, in the later districts, of the late winter or early spring crop, of pines and bananas, also of strawberries and Cape gooseberries, will continue to occupy the attention of fruit-growers. We can only repeat the advice we have so often given in these Notes respecting the marketing of all kinds of fruit—viz., to grade the fruit evenly, pack honestly, and display it to the best advantage if you want to get good returns.

September is a very important month to the fruit-grower, owing to the fact that it is usually a dry month, and that it is essential in all cases

to keep the land in a high state of tilth, so as to retain the moisture that is required by the various trees that are in blossom, thus securing a good set of fruit. Where irrigation is available, it is advisable to give the trees a good watering should the ground be dry, as this will induce a good growth and cause the fruit to set well. If an irrigation is given, it should be a thorough one, not a mere surface watering, and once the land is saturated the moisture must be retained in the soil by constant and systematic cultivation. If this is done, one good watering will usually be enough to carry the trees through in good condition to the thunderstorms that come later or even to the summer rains, if the soil is of a deep sandy loamy nature.

No weeds must be allowed in the orchard or vineyard at this time of the year, as they are robbing the trees and plants of both the water and plant food that are so essential to them at this period of their growth.

There is not much to be done in the way of fighting scale insects during the month, as they are more effectually dealt with later on; but where young trees are showing signs of distress, owing to the presence of scale insects, they should be treated, the gas method being the most efficacious.

Beetles and other leaf-eating insects often make their appearance during the month. The best remedy is to spray the trees or plants with one or other of the arsenical washes that are recommended by me in this journal. The vineyard will require considerable attention. Not only must it be kept well worked, but any vines that are subject to the attack of black spot must be sprayed from time to time with Bordeaux mixture. Disbudding must be carefully carried out, as this work is equally as important as the winter pruning, as it is the best means of controlling the future shape of the vine. A very common fault with vines grown in the coast districts is that the buds often remain dormant, only the terminal bud and possibly one other starting into growth, thus leaving a long bare space on the main rods, which is undesirable. When this takes place, pinch back those shoots that have started, and which are taking the whole of the sap, and force the sap into the dormant buds, thus starting them into growth. This will result in an even growth of wood all over the vine—not a huge cane in one part and either a stunted growth or dormant buds on the rest.

Every care should be taken during the month to prevent the fruit-fly from getting an early start. All infested oranges, loquats, kumquats, or other fruits should be gathered and destroyed, as the keeping in check of the early spring crop of flies, when there are only comparatively few to deal with, will materially lessen the subsequent crops. Land that is to be planted to pines or bananas should be got ready now, though the planting need not be done till October, November, or even later. Prepare the land thoroughly; don't scratch the surface to the depth of a few inches, but plough as deeply as you have good surface soil, and break up the subsoil as deeply as you can possibly get power to do it. You will find that the extra money expended will be a profitable investment, as it will pay every time.

## THE TROPICAL COAST DISTRICTS.

September is usually a very dry month, and fruit trees of all kinds suffer in consequence. The spring crop of citrus fruits should be harvested by the end of the month, as, if allowed to hang later, there is a great risk of loss by fly. The fruit should be well sweated; and, if carefully selected, well-graded, and well packed, it should carry well to, and fetch high prices in, the Southern States, as there are no oranges or mandarins grown in Australia that can excel the flavour of the best of the Bowen, Cardwell, Cairns, Port Douglas, or Cooktown fruit.

As soon as the fruit is gathered, the trees should be pruned and sprayed with the lime and sulphur wash, as this wash is not only a good insecticide, but it will keep down the growth of all lichens, mosses, &c., to which the trees are very subject.

Every care should be taken to keep down the crop of fruit-fly during the month. All infested fruit should be gathered and destroyed, particularly that in or adjacent to banana plantations. Watch the banana gardens carefully, and keep well cultivated. New land should be got ready for planting, and where land is ready planting can take place.

Papaws and granadillas are in good condition now, and, if carefully gathered and well packed in cases only holding one layer of fruit, they should carry well to the Southern markets if sent in the cool chamber.

## SOUTHERN AND CENTRAL TABLELANDS.

Prune grape vines at Stanthorpe in the early part of the month, leaving the pruning as late as possible, as the object is to keep the vines back in order to escape damage from late spring frosts. All vines subject to the attack of black spot should be treated with the winter dressing when the buds are swelling; this treatment to be followed by spraying with Bordeaux mixture later on.

Where fruit trees have not received their winter spraying, they should be treated at once before they come out into flower or young growth. Where the orchard or vineyard has not been ploughed, do so, taking care to work the land down fine as soon as it is ploughed, so as to keep the moisture in the soil, as the spring is always the trying time for fruit trees.

Look out for fruit-fly in the late oranges and loquats in the Toowoomba district. Keep the orchards and vineyards well cultivated; disbud the vines when sufficiently advanced. Spray for codlin moth.

In the Central tablelands irrigate vines and fruit trees, and follow the irrigation with deep, constant, and systematic cultivation. Keep down all weed growth, and fight the red scale on citrus trees with cyanide. The objective of the fruit-growers throughout Queensland during September and the following months is, "How best to keep the moisture in the soil that is required by the trees, vines, plants, and vegetables;" and this objective can only be obtained by irrigation where same is available, or by deep, systematic, and constant cultivation where there is no water available for irrigation.

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# Agriculture.

## THE LOCATION OF WATER BY MEANS OF THE DIVINING ROD AND AUTOMATIC WATER FINDER.

BY G. B. BROOKS, Instructor in Agriculture.

One of the most important problems the settler commencing operations has to solve is the securing of an ample supply of water for farm use.

In several districts the absence of permanent water and the uncertainty of finding an underground supply has been a serious drawback to agricultural progress.

In localities where the subsoil is of a retentive nature, this difficulty can be met by the storing of water in dams or tanks. Unfortunately, in many of our scrub areas the soil is so deep and porous that conserving water by this means is invariably a failure, and the settler has, therefore, to resort to the obtaining of a supply from either a well or bore.

The selection of a site for such is of very great importance, for, if a supply cannot be obtained at a reasonable depth, the cost of both sinking and subsequent lifting of the water becomes a very expensive item. It is well known that large sums of money have been spent and much time lost by operating on unfavourable situations.

The location of underground supplies at a comparatively shallow depth is by no means a simple matter in many districts. A method by

which such could be determined with certainty would be of inestimable value both to the settler and to the State at large.

It is claimed by many that there is such a method which has been in existence for generations—viz., the mysterious divining rod.

Much controversy has raged as to the efficacy of this method. Scientists have given the subject much consideration, but, as far as I am aware, the results obtained from investigations made are somewhat conflicting.

It is also claimed that a large amount of success has resulted from the use of a mechanical device known as the "automatic water finder"; two of these instruments are in possession of the Lands Department.

To me, the subject of water supply for the farm is of absorbing interest, for I find in my work amongst the settlers in recently settled scrub areas that a tremendous handicap is placed upon the agricultural progress of the district by its absence—in fact, the first information invariably asked for is in connection with the obtaining of such.

On admitting my belief that certain individuals have the power to locate underground supplies by means of divining, and, moreover, having this gift myself, my services are usually requisitioned in the selection of a site for sinking operations.

Although the location of water is what may be termed a side-line in connection with my work, entailing a little extra time and labour, yet the benefit accruing is ample compensation should the settler succeed in securing a supply at a reasonable depth.

In the hope of solving the mystery of the divining rod—or, at least, in obtaining some fresh information regarding it—it was thought that an excellent opportunity presented itself to carry out some tests in this direction. One of the instruments belonging to the Lands Department was, therefore, obtained on loan; and when on a recent visit to Mount Larcom and the districts adjacent to the Dawson Valley Railway line, both methods were put into operation, the one being used as a check on the other.

Although this occurred only a comparatively short time ago, several reports have already come to hand, stating that water had been secured at shallow depths on the site indicated. So far I have not yet heard of any failures.

Those who are sceptical in regard to the use of the divining rod (in my opinion the actual rod has very little to do with it) may say that

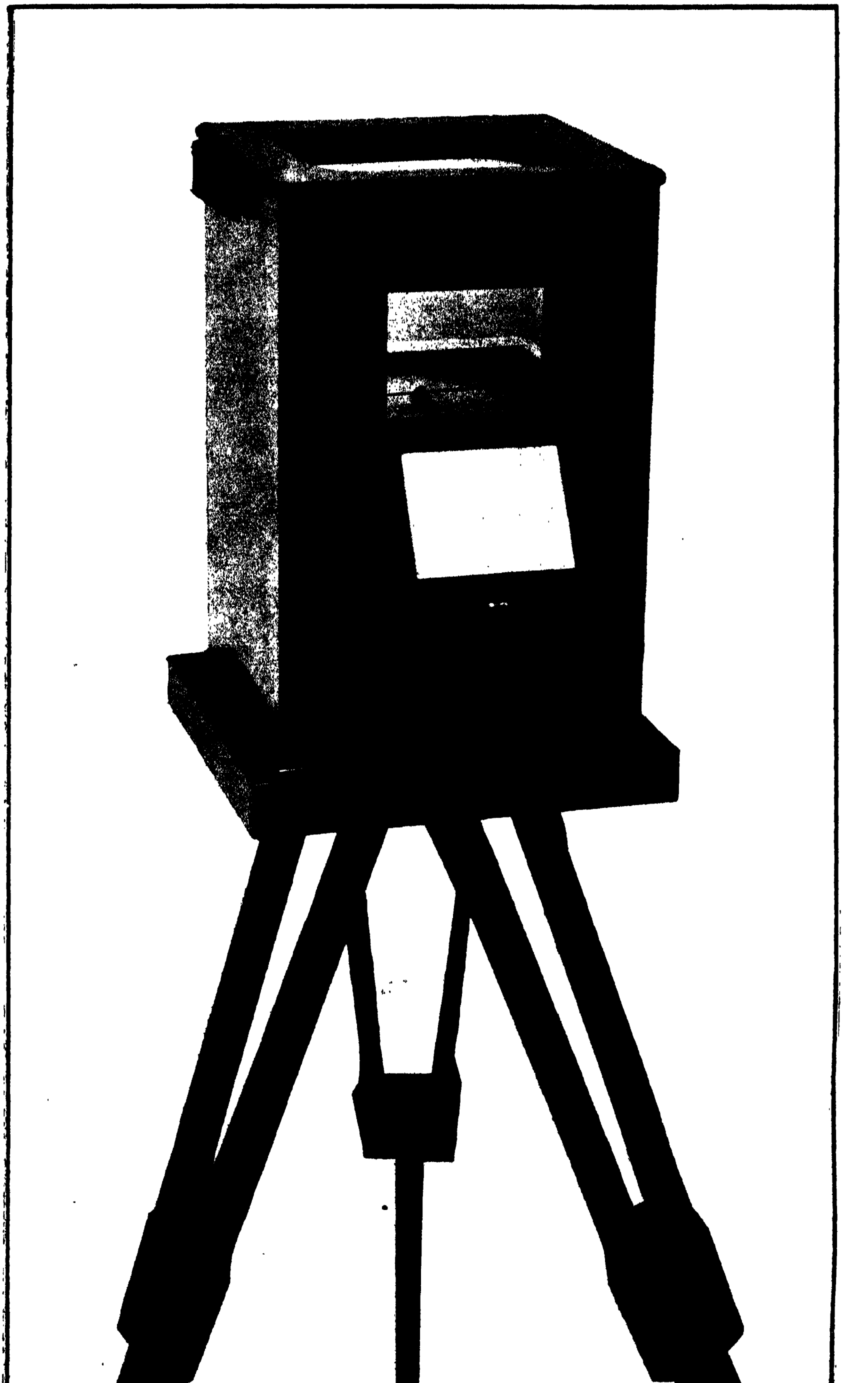


PLATE 54.—THE AUTOMATIC WATER FINDER.

the finding of water is no proof that the stream was located by this means, as in all probability a supply could have been obtained anywhere in the same locality at a corresponding depth. This may be quite true, but, apart from the finding of water, the results obtained from the tests were, if not startling, at least of very great interest, and, I think, go to prove that the divining rod is not altogether a piece of tomfoolery as many imagine, for I quickly discovered that a very intimate relationship existed between the movements of the instrument and those of the diviner.

It may be mentioned that in the location of a site the method of procedure was to first prospect the ground with the rod, marking the spot where indications were secured, and afterwards checking it with the instrument.

The remarkable part of the proceeding was that I was able in most instances, by using the rod, to inform those present how the instrument would behave even before it was taken out of the case. This, I think, goes to show that there must be an electrical or magnetic influence in existence between the individual and a current of water moving through and near the surface of the earth. This influence is probably only exercised over those endowed with special sensitiveness.

The automatic finder may be described as an electrical or magnetic device enclosed in a small case supported on a tripod. The internal mechanism is surmounted by a dial with delicately adjusted magnetic needle some 6 in. long

It is claimed that if the instrument, after being carefully adjusted with a compass, is placed in close proximity to an underground stream of water the needle will be deflected in that direction.

Observations on readings were taken on the respective sites and duly recorded. A few of these are shown herewith, from which it will be seen that the deflection or movement of the needle is in some instances very considerable.

In each of the illustrations shown, the test with the instrument was first made on either side, and then finally on the centre of the stream as located by the divining rod.

It was invariably found that when placed on the middle of a stream running north and south the needle would eventually come to rest at zero, but when running east and west the behaviour was altogether different, a wide deflection with a continuous movement being the result.

The subject of locating water is undoubtedly of considerable importance and one that offers a large field for investigation. There are probably many secondary influences which affect both the diviner and the working of the instrument. For instance, I have observed that it is difficult to get satisfactory results with the rod during a thunderstorm. An electric disturbance would, in all probability, also cause a variation in the instrument.

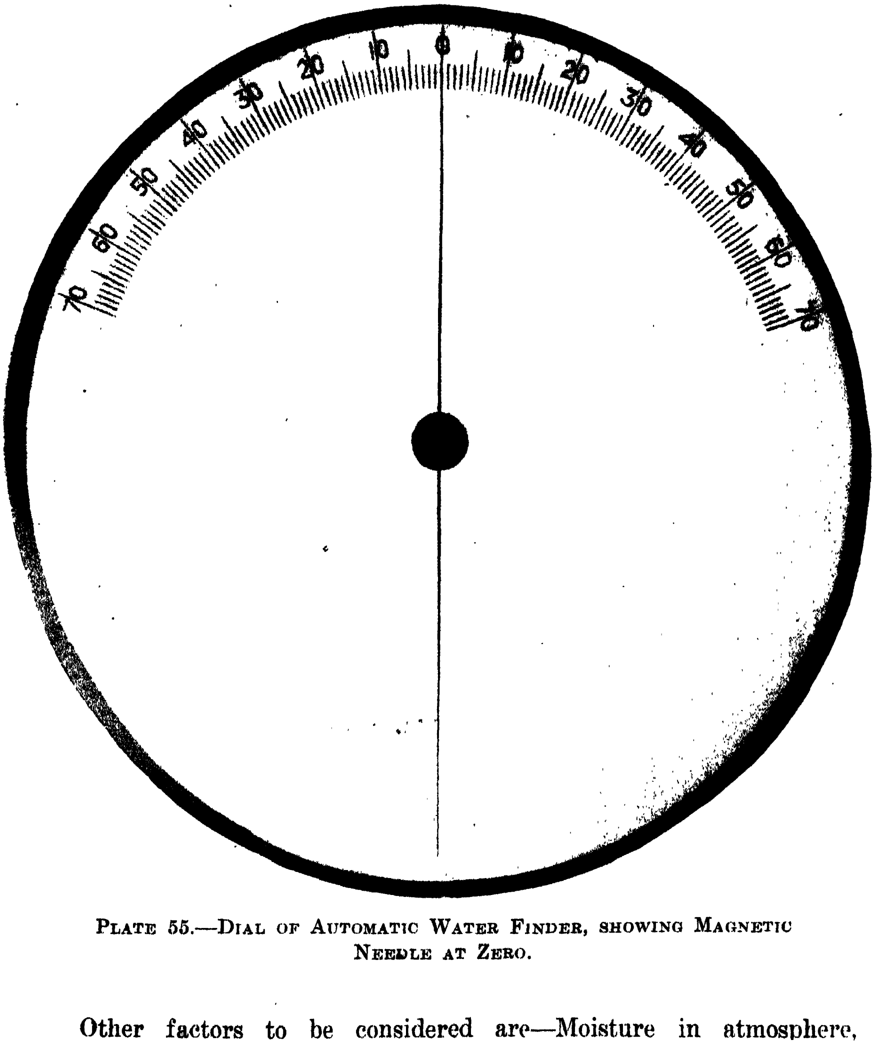



PLATE 55.—DIAL OF AUTOMATIC WATER FINDER, SHOWING MAGNETIC NEEDLE AT ZERO.

Other factors to be considered are—Moisture in atmosphere, proximity to growing timber, heavy clay subsoil, ironstone or other minerals, condition of sky (cloudy, &c.), the time tests are carried out (morning, noon, &c.), physical condition of diviner (sensitiveness, effect of excitement, &c.)

### REFERENCE NOTES TO DIAGRAMS.

.............. Dotted line shows where prospecting has been done with divining rod.

× Where indications of water were found.

———————— Direction of stream.

1 – 3 Numerals show where tests were made with automatic water finder.

30 20 10 0 10 20 30

Readings given by indicator on dial of instrument.

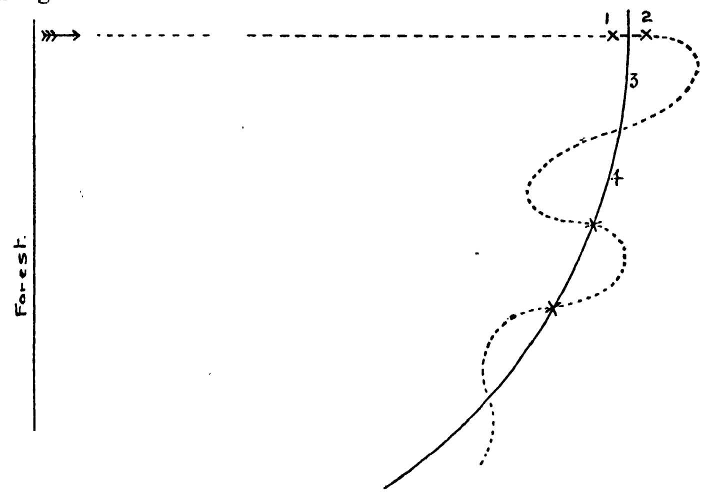
## OBSERVATION NOTES—SITE No. 1.

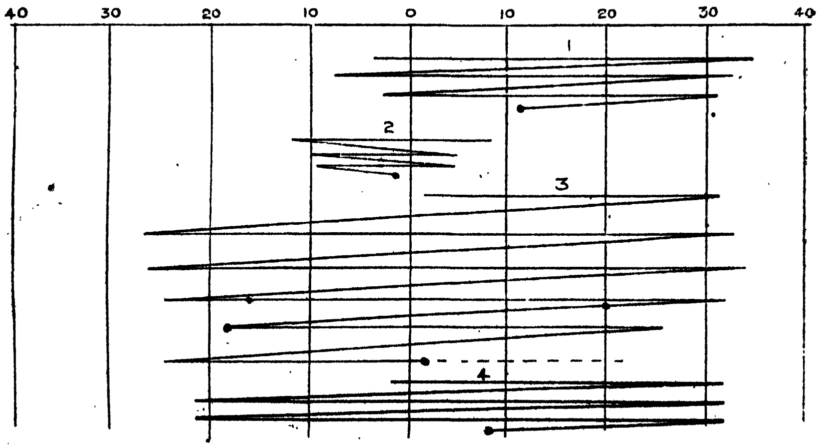
Date, 30-3-14. Time, noon.

Weather, fine; wind, S.E.; scattered clouds.

Standing forest, about 200 yards N. of site.

Land: Cleared forest and scrub. Was informed that the site selected was right on the divide.



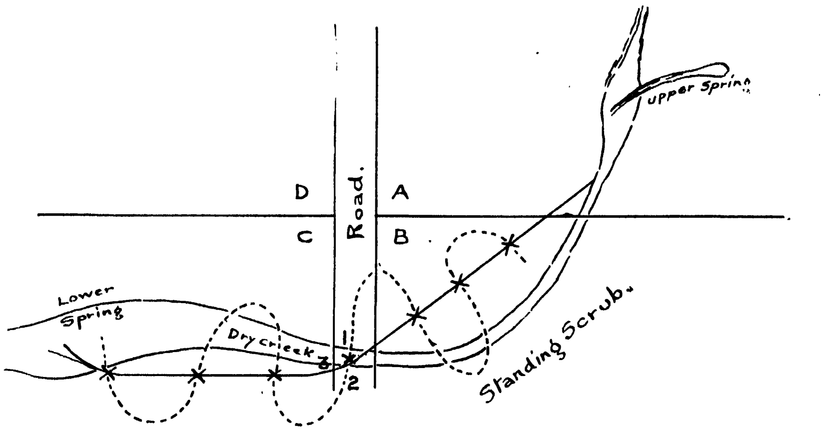



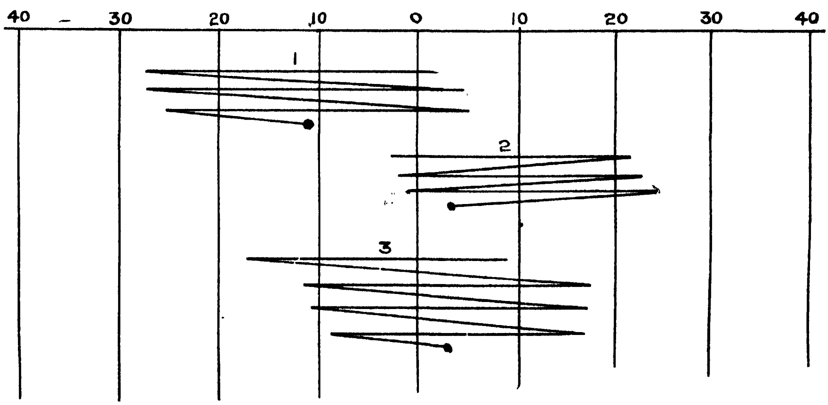

Needle movement slow and steady when instrument was placed on either side of stream indicated by the divining rod, but when placed on actual spot the effect was remarkable, a very wide deflection with quick continuous movement being the result.

## OBSERVATION NOTES—SITE No. 9.

Date, 31-3-14. Time, 2.30 p.m.

The object in this instance was to locate an underground stream of water flowing between two springs. A strong flow from an upper spring disappears in the limestone formation, apparently coming to the surface again in the bed of the creek some 300 yards distant, on a different selection.




The selector in B put down several wells in the bed of this creek in the hope of tapping the stream, but with negative results.

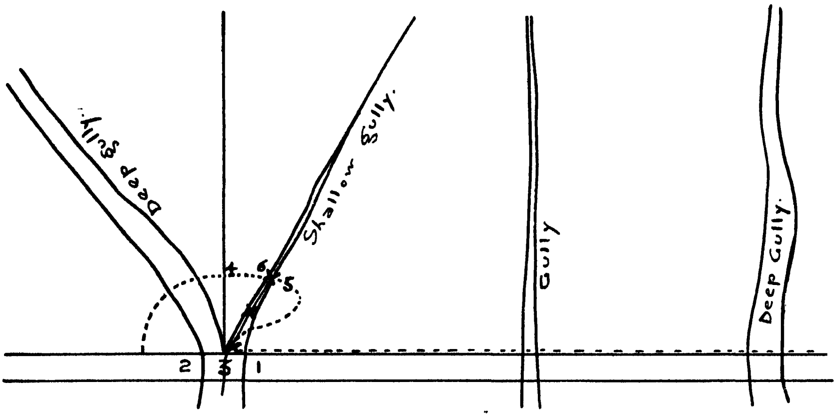
Both divining rod and instrument indicated that the flow followed a course quite different to that of the gully.

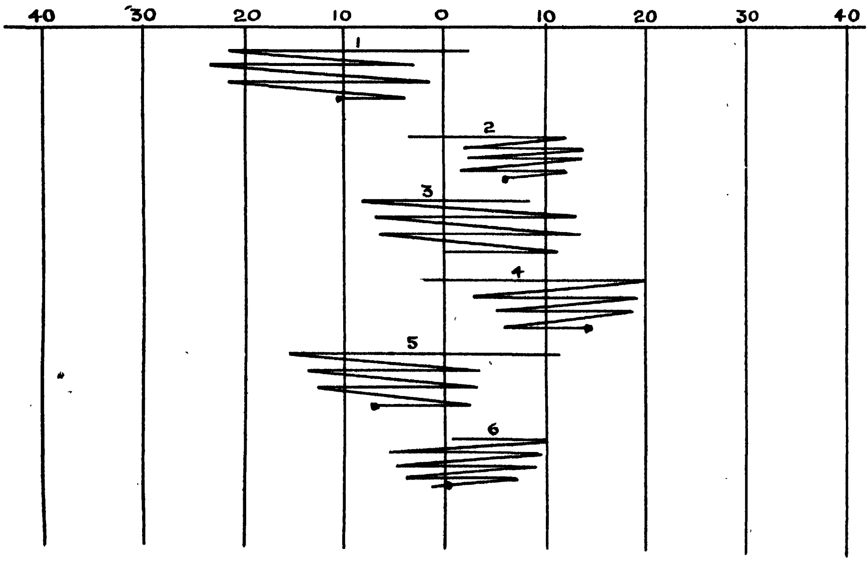
## OBSERVATION NOTES—SITE No. 3.

Date, 30-3-14. Time, 4 p.m.

Weather, fine; wind, S E.; scattered clouds.

Land: Cleared scrub. Standing scrub opposite side of road.



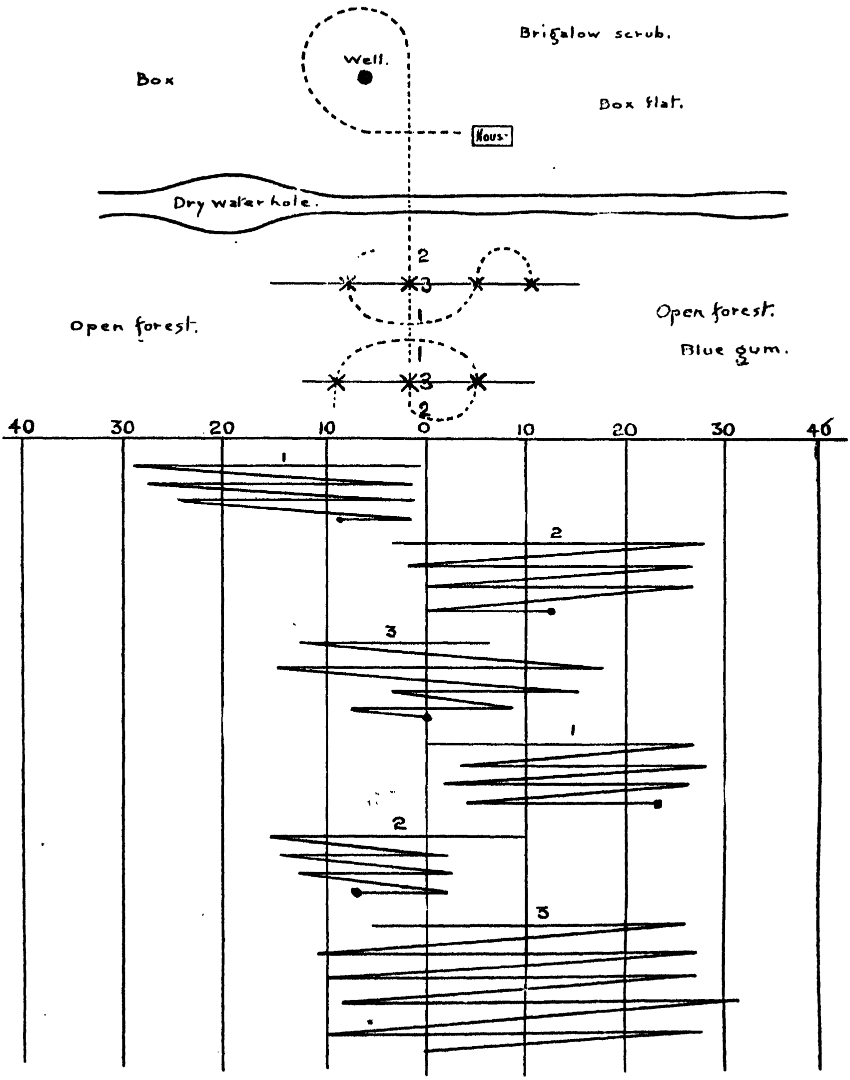

Indications of water obtained right on boundary line; needle movement very steady.

## OBSERVATION NOTES—SITE No. 16.

Date, 4-5-14. Time, 5 p.m.

Weather, fine; wind, S.E.; open sky.

Land: Open forest. Box and brigalow country some 300 yards distant. Well put down on box flat over 80 ft. deep; no water.




Secured indications of two streams. Needle movement on first quivering and jerky; on second, when instrument placed immediately adjacent to stream movement, steady; but when right on stream, quick and continuous.

## OBSERVATION NOTES—SITE No. 2.

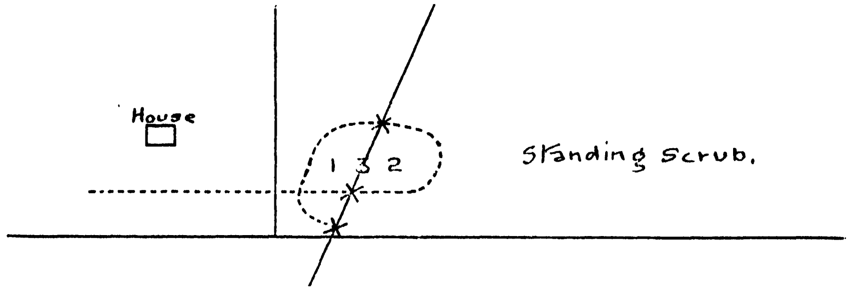
Date, 30-3-14. Time, 1.30 p.m.

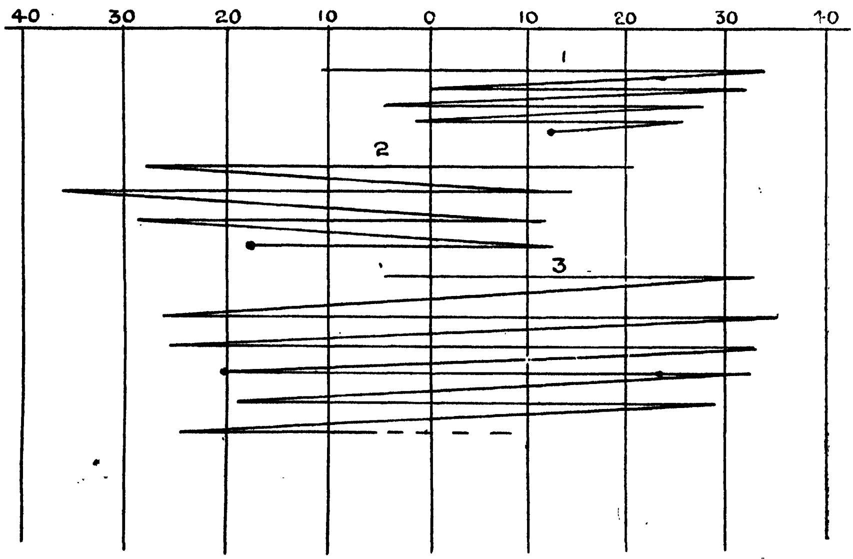
Weather, fine, very hot; few scattered clouds; no wind.

Land: Cleared scrub. Heavy crop of Rhodes grass. Standing scrub 50 yards distant.

Limestone abundant in locality Probability of ironstone.

Movement of needle, quivering and erratic; practically continuous movement on site selected by divining rod.




## OBSERVATION NOTES—SITE No. 5.

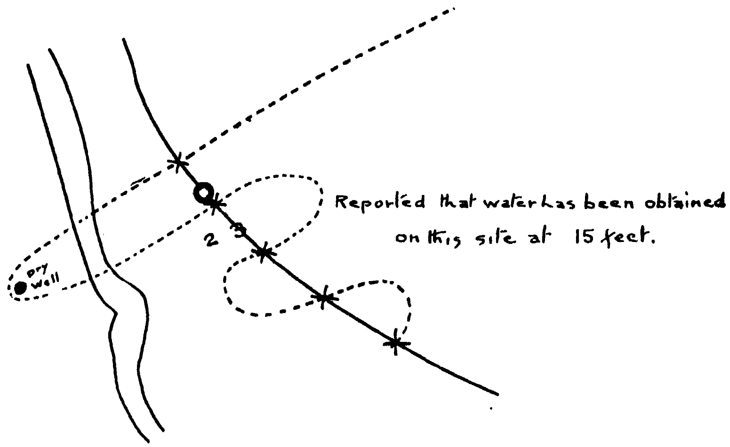
Date, 27-3-14. Time, 2 p.m.

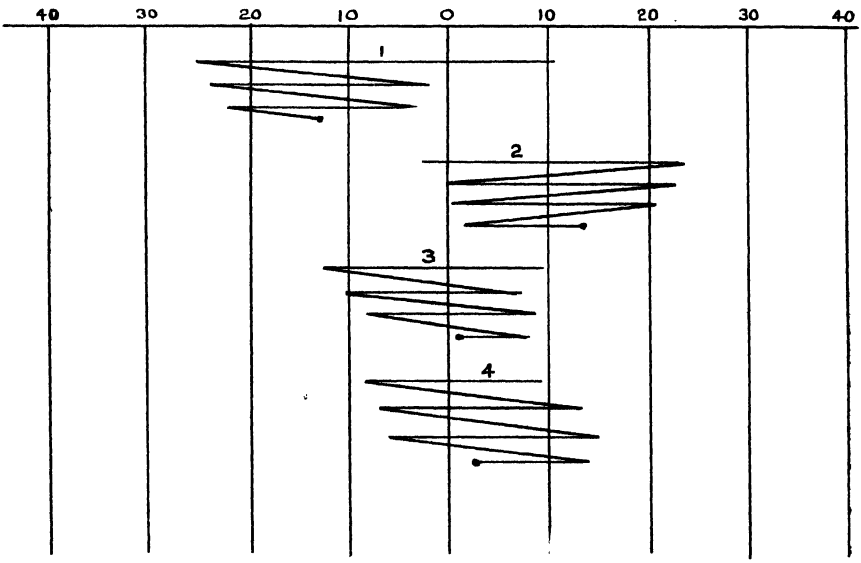
Weather, fine; very hot; few scattered clouds; no wind.

Land: Cleared scrub. Standing scrub about 100 yards W. side.

Two wells put down previously on same flat with negative results.

Movement of needle, steady




## CORN-GROWING COMPETITION, 1914-15.

1. This competition will be open to all under the age of eighteen years who are residents of the State of Queensland. An entrance fee of 2s. 6d. must be forwarded to the Under Secretary with the application to enter.

2. Applications to be enrolled in the competition containing the following particulars must reach the Under Secretary, Department of Agriculture and Stock, Brisbane, not later than 12 noon on 21st September, 1914:—

(*a*) Full name and address.
(*b*) Age at last birthday and date of birth.
(*c*) Occupation
(*d*) District in which applicant resides.

3. The area to be devoted to the planting of the seed maize shall be one-tenth of an acre, selected seed for which will be supplied free of cost; but one parcel only will be supplied to each competitor during the period of the competition.

4. Each competitor shall have absolute freedom in his choice of ground, and in the methods he may adopt in preparing, planting, and cultivating his plot, but in no case shall a plot exceed one-tenth of an acre, otherwise disqualification will be incurred.

The following table shows the length the rows must be to give the exact area according as 4, 5, 6 or more rows are planted:—

| Number of Rows 4 feet apart. | Length of Rows in Feet. | Number of Rows 4 feet apart. | Length of Rows in Feet. |
|---|---|---|---|
| 4 | 272 feet 3 inches .. | 8 | 136 feet 1½ inch |
| 5 | 217 feet 10 inches .. | 12 | 90 feet 9 inches |
| 6 | 181 feet 6 inches .. | 16 | 68 feet |
| 7 | 155 feet 7 inches .. | | |

5. Each competitor will be required to keep a record chart showing the dates and particulars of the different stages of work, and these charts are to be delivered, at the time of harvesting, to the officer appointed for superintending and verifying the yield. Duplicate forms for recording all work done and observations made on the plot will be supplied to each competitor.

6. Within seven days from the verification of the yield from the crop, each competitor shall select, without aid from other persons, ten cobs of the maize from his crop and forward them to the Principal of the Queensland Agricultural College, Gatton. Labels for this purpose will be supplied.

7. Competitors must notify the Under Secretary of the date when the crop shall have matured and be ready for inspection.

8. No competitor shall be allowed to employ or permit any labour upon the competition plot standing in his name, other than his own personal labour, excepting in relation to the driving of horses, for which, owing to circumstances, such help may be needed.

9. The competition will close on the 30th June, 1915, and the prizes will be allotted thus: The competitors will be grouped according to the following districts:—

(1) LOGAN.—From the coast to Six-Mile Creek, by railway line, then in south-west direction to Mount Lindsay, border of New South Wales.

(2) WEST MORETON.—From the Logan boundary on the east to the Main Range, north to Yarraman, south-west to border of New South Wales.

(3) DARLING DOWNS NORTH.—To and including Greenmount, Pittsworth, Jondaryan, Goombungee, Crow's Nest, Spring Bluff, Oakey, Drayton.

(4) DARLING DOWNS SOUTH.—Including Nobby to Wallangarra, Texas, Goondiwindi, Killarney, Freestone, Leyburn, Condamine, Yandina, Darkey's Flat, Clifton, Allora, Millmerran.

(5) MARANOA.—From and including Dalby to Charleville, Mitchell, Morven, Cunnamulla, Mungindi, St George, Surat.

(6) MORETON.—From and including Nundah, North Pine, Nudgee, Caboolture, Woodford, Kilcoy, Sandgate, Samford, Samson Vale, Humpybong, Maroochy, Eumundi; northern boundary to include parishes of Kenilworth, Maleny, and Conondale, thence south by Mary River.

(7) WIDE BAY AND BURNETT.—From the coast and including Biggenden, Kilkivan, Nanango, Gayndah, Tewantin, Degilbo, Pialba, Howard, Maryborough, Gympie, Bundaberg, Childers, Gin Gin, Isis, Mount Perry, Eidsvold. Northern boundary, 24½ degrees of latitude, Dawson River on west.

(8) CENTRAL QUEENSLAND.—From 24½ degrees of latitude to and including St. Lawrence, Gladstone, Rockhampton, Mount Morgan, Emerald, Jericho, Springsure, Clermont, Aramac, Longreach.

(9) NORTH QUEENSLAND.—North of St. Lawrence to and including Mackay, Bowen, Townsville, Cairns, Cooktown, Atherton, Charters Towers, Ravenswood, Winton, &c.

If there are more than ten competitors in any district three prizes will be awarded for competition in that district; less than ten competitors, one prize only.

The prizes shall be of the following value:—First, £5; second, £2; third, £1.

No money prizes will be given, but each successful competitor will be allowed to select some article to the value of his prize

The prizes awarded in any district may be increased in number and value by donations from persons, firms, or societies who may be interested in the competition.

10. Three special prizes of the value of £10, £5, and £3 will be awarded to the competitors who stand first, second, and third in the entire competition.

These prizes may be increased in number and value in the same way as is indicated above in connection with the district competitions.

11. The aggregate points will be 100 and the judging will be based upon the following:—

(a) Quality of the maize produced.

(b) Yield of plot.

(c) Notes and records of plot.

12. Arrangements will be made for such of the competitors as may so desire to travel by rail to the Agricultural College during the week when the judging is decided, when instruction in corn-growing and judging will be afforded.

13. The Principal of the Queensland Agricultural College will be the sole judge of the competition, and his decision shall be final.

JOHN WHITE, Secretary for Agriculture and Stock.

Brisbane, 15th August, 1914.

## POTATO GROWING: HINTS TO FARMERS.

By F. W. ULBRICH, Agricultural Inspector (Tas.)

During the month of May all seed potatoes for early and late crops should be placed in whatever receptacle has been set aside for the "Greening Process."

Any dry, well-lighted, clean shed where the wind has access to the tubers will do.

No tubers for seed should be placed on the bare ground.

All flooring should be open, so as to admit of free currents of air.

Tubers should be spread in thin layers, not more than two deep.

Select only the best-shaped and truest to type of any variety.

Any tubers showing signs of disease should be removed and "*destroyed by boiling or burning.*"

For the past two seasons some growers have been using a very handy, cheap, and almost ready-made and easily-removable "shed" for the purpose of greening seed. I allude to any three or four railed fence adjacent to a row of pine trees, which, I am pleased to say, are ready to hand on a number of farms in this State. The method followed is:—Run another fence parallel to the one already in existence; place rails or any handy timber from rail to rail, beginning with the bottom one. Cover these rails with tubers, and then proceed to do the same on the second rails, and so on till each panel of fencing carries its quota. A rough roofing may be easily provided by using either galvanised iron sheets or bark, so as to keep any excessive rain from reaching the tubers before they are greened; when once greened, neither rain or frost will do any harm. Tubers so treated will not have any long shoots, but only short, strong, stout ones, which are not easily knocked off.

The use of formalin as a steep for tubers is confidently recommended. It is immaterial whether tubers be dipped cut or whole.

Tubers must be allowed to dry after being steeped before planting. The steep recommended is 1 lb. bottle of formalin to 32 gallons of water.

Tubers or sets should be steeped for two hours, but should a grower forget to remove any from the dip at the end of two hours he need not be alarmed, as the writer has had "*no misses*" from sets (cut) that had an all-night bath. This experience has been verified by more than one grower.

No grower should plant potatoes this year in any paddock where a "grubby" crop was the result of last season's work. Give the old paddock a good liming *at once*, if not already done, and plough to 6 in. at least, taking care to carefully turn the sod.

Where the green manuring is to be tried this coming season, growers would be well advised to pack the green crop well when ploughing under.

In order that plenty of soil may be available for covering the tubers of next season, growers are again urged to set every fourth furrow of 8 in., so as to give 32 in. between the rows.

The advantages of this have been stressed by the writer times out of number, and they are, briefly, more soil for covering purposes. The hills will not be so abrupt, and consequently the soil does not fall back into the drill, but remains where it is needed.

The greater width gives more room for that clean cultivation which is necessary to keep prevailing pests in check.—" Agricultural Gazette of Tasmania."

## BROOM MILLET.

Growers along the Hunter, the Richmond, the Manning, and sister rivers, are surprised when told of the relatively large prices realised in Sydney, Melbourne, Hobart, Launceston, and New Zealand ports—during a lean season in New South Wales—for supplies of broom millet from Italy and the United States. Growers here of this line have yet fully to learn a similar lesson to that taught to Cumberland growers of lemons and oranges by Italian growers. This lesson related to care in gathering, in grading, to tissue wrapping, and to packing in suitable boxes. So with the broom millet. The Italian and American shippers are exceedingly careful as to what the trade terms the get-up of the bales. Thereby the Sydney price of foreign prime long hurl is enhanced, it being graded and carefully packed; also, there is never, in these arrivals, the slightest attempt to add false weight, as, unfortunately, used to be a practice with a small section of New South Wales senders, who made weight by a sly addition of stones, earth, &c. This practice has ceased since its exposure by Christchurch and Dunedin consignees.

The omission now is in care in get-up for the Sydney market. It would be the height of folly for New South Wales river growers of broom millet to despise taking a lesson from foreign senders. Timely attention to marketing puts money in the farmer's pocket. Not only so, but a Hunter River or other grower quickly gains a reputation for care and reliability in the get-up; and, when his name is established, his produce sells offhand on reputation, whereas the bales that arrive from a grower who is "sometimes careless" cannot be sold at sight, and often suffer in price through having to wait till the buyers make a thorough inspection.

Further, it has for years been a common mistake with many river consignors to think that a little of the second grade, or a little of the discoloured and inferior, intermixed with the long hurl packages will do no harm in the cash receipts. On the contrary, the detection of a few handfuls of second and lower grades will excite the buyers' suspicion, and may materially lower the gross value of a bale that is "nearly all choice hurl." The buyers, in the hurry-scurry of business, have no time to spend in an ultra-inspection, in order to find out if inferior stalks are purposely mixed (even in minute quantities) with prime. The Northern River sender who wishes to get the top price of the day in Sussex street—£35 a ton—needs to be "minutely honest" in grading.—" Town and Country."

## PROFITABLE FARMING.

The excellent returns which are recorded from time to time resulting from planting and sowing tubers and cereal seeds which have been carefully bred—and which, after much experiment, have been placed on the market, often at very high prices—go to prove that by such breeding far higher average crops have been obtained than by sowing the same kind of seed year after year because it is cheap.

"Garden and Field" records that an English farmer has raised a crop of wheat which realised £1,666 7s. 3d., without the value of the straw, from the produce of 8 bushels, which he purchased two years ago at 1 guinea a bushel. The wheat is a new variety brought out by the Cambridge University School of Agriculture, and he purchased the seed for £8 8s. The first year he had a crop of 349 bushels. Planting the whole of this, he had a total crop of 6,160 bushels, which he sold for the price stated.

## NATIONAL SHOW, 1914—COURT OF THE DEPARTMENT OF AGRICULTURE AND STOCK.

The Court occupied by the Department of Agriculture and Stock this year at the National Show covers approximately 6,000 sq. ft. of floor space and 3,000 sq. ft. of wall space.

Taken as a whole, the exhibits are so arranged as to bring before the public a number of individual sections, representing a part of the Department's activities, these being classed in such a way as to afford as much information as possible, at the same time being of a highly educational character.

In a general way the trophies are grouped under four main headings:—Tropical, Temperate, Pastoral, and Agricultural. The several divisions are made up by—

- Tropical Products from Kamerunga.
- Exhibit of Sugar-cane from Mackay Sugar Experiment Station.
- Wool Trophy.
- Entomology and Plant Pathology (four trophies), as follows:—
  - Diseases of Fruit and Vegetables.
  - Queensland Butterflies, Moths, and Beetles.
  - Life Histories of Insects Injurious to Fruit and Vegetables.
  - Insectivorous Insects of the Moreton District.
- Botanical Exhibit, embracing the Chief Natural Grasses of Queensland and 54 framed Specimens of Weeds and Suspected Poisonous Plants.
- Wheat and Wheat-milling Exhibits—the former being drawn from the chief growing districts of the State, the State Farms at Hermitage and Roma, and the Departmental Experiment Plots; the latter from the Agricultural Chemist's Model Flour Mill and Laboratory.

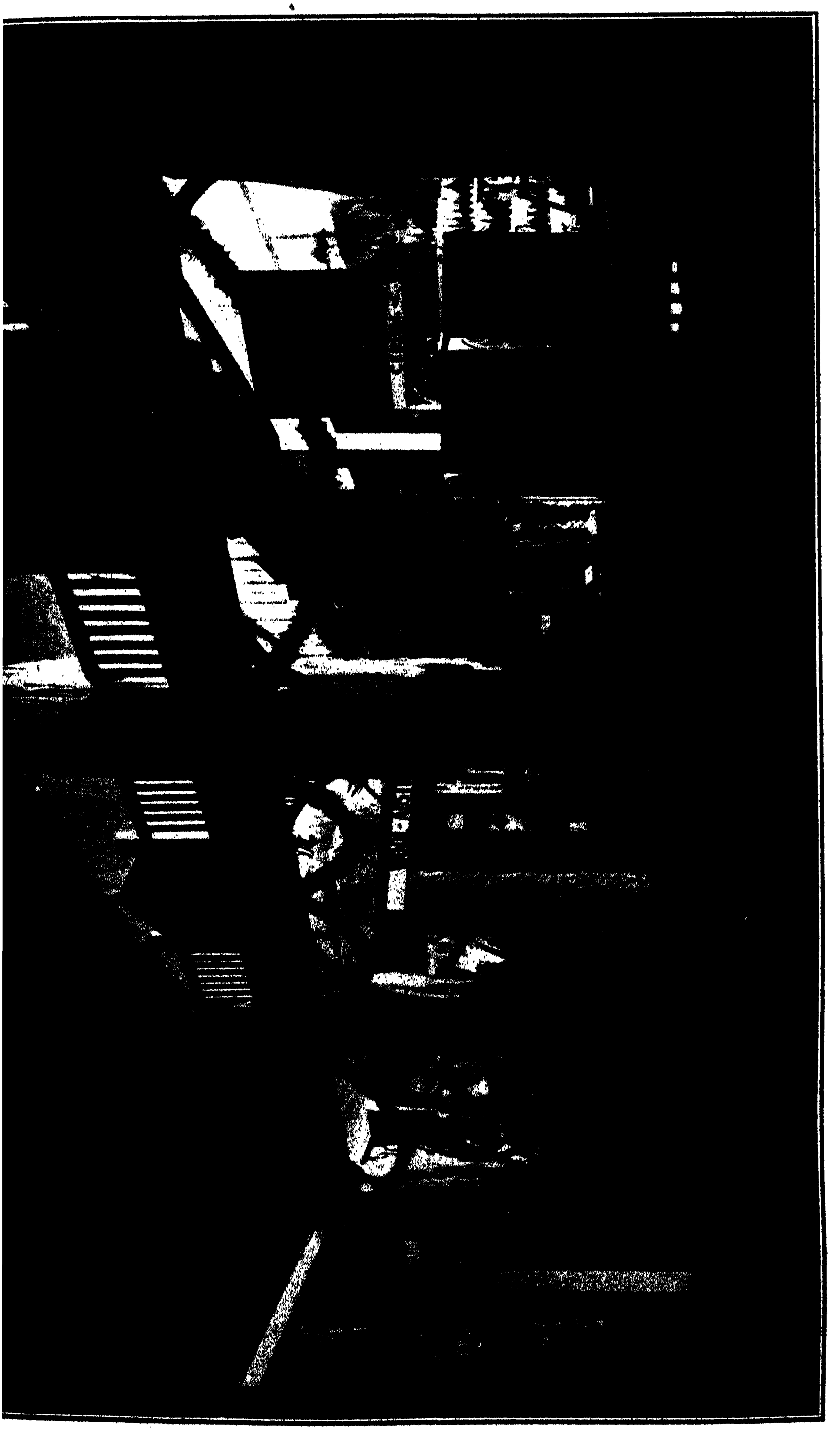


PLATE 56.—FRONT OF DEPARTMENTAL COURT (AGRICULTURE AND STOCK), NATIONAL AGRICULTURAL ASSOCIATION SHOW, BRISBANE, 1914.

Dry Farming Exhibit, illustrating the work carried out at the Roma State Farm, which includes Wheat and Cowpea Breeding Experiments.

Maize Exhibit from the Departmental Seed Grain Propagation Plots.

Bacteriological Exhibit from the Stock Experiment Station, Yeerongpilly.

Division of Dairying (Statistical).

Fruit Exhibit.

Broom Millet Trophy.

Tobacco.

Exhibit of Harness and Blacksmithing Work from the Agricultural College, Gatton.

Taking each exhibit *seriatim*, fuller descriptions are as follows:—

## KAMERUNGA STATE NURSERY.

Whilst the majority of purely tropical fruits and other products of the soil will thrive in many parts of Central and Southern Queensland, it is to the Tropical North that we must turn our attention to find them in their fullest development. Of the many tropical fruits raised, new varieties of mangoes may be mentioned, such as the Badaga and Malda Seedling, and the high quality Carabao mango from the Philippines. An entirely new Cherimoya (Custard Apple), *Anona cherimolia*, far superior to that class of fruit usually seen in the Southern markets, has been introduced experimentally.

The Mangosteen, which has several times been imported from Java, both as seed and plant, had never been a success until in 1891 and 1892. Eventually four trees survived at the Nursery, and so slow was the growth that it was only in 1913 that one of the trees flowered and bore fruit, which tree was the first and only one of 600 seeds to mature its fruit in Queensland.

It is entirely due to the work of the Nursery that rubber trees of different varieties have been planted in small areas in the North. Several thousands of trees have almost reached the tapping stage, whilst at Kamerunga the Pará rubber trees have been several times tapped. Specimens of the growing trees, tapping instruments, and of the finished article may be seen at the Exhibition, as well as of other products, such as vanilla, which thrives well in the North and produces heavy crops of this valuable bean, which takes two or three years to come into crop, and can readily be made to pay, and pay well, in tropical Queensland.

Visitors and Southern settlers know practically nothing about the economic value of such products as are here to be seen, such as various fibres, kola nuts, coconuts, coca from which the cocaine of commerce is produced, ginger, spices of various kinds, pepper and other condiments—all going to show that they can be produced as well in North Queensland as in the West Indies, Dutch East Indies, Brazil, or any other purely tropical country. Coffee is also not wanting. Sweet potatoes and yams


PLATE 57.—KAMERUNGA STATE NURSERY EXHIBIT, DEPARTMENTAL COURT, N.A. SHOW, BRISBANE, 1914.

can be grown well in the North, and there are five or six varieties grown at the Nursery—the Large White Potato and New Guinea Panna Potato, the White Chinese, &c.—all good table yams. Cardamoms are also grown to some extent, as well as the now well-known Gros Michel Banana and the rarer Breadfruit, so intimately associated with the wonderful boat voyage of Captain Bligh.

Besides all these, there are shown oils and gums of various kinds, drugs and fibres, mountain rice, &c.

## SUGAR-CANE.

The Exhibit of Canes sent in by the Director of the Sugar Experiment Station, Mackay—many originally imported from New Guinea, others raised from seed at Hambledon, Cairns, and by the Acclimatisation Society—give evidence of what may be achieved by careful selection and scientific cultivation. Each variety shown is accurately described as to nomenclature, habit of growth, suitability for different localities and different soils, its propensity or otherwise for arrowing, &c.

In fact, all the information required by the cane-grower to enable him to select any variety is clearly and concisely given. It is doubtless largely owing to the distribution of new and valuable canes, such as many of those here seen, that a record crop of 242,000 tons of sugar was obtained last season in Queensland, and, judging by the reports of various cane inspectors, it would appear as if this year's crop will not fall far short, if at all, of the same tonnage.

## WOOL EXHIBIT.

The greater part of the activities of this branch of the Department's work cannot well be shown in a concrete form. The Exhibit, however, shows clearly the fruits of good sheep-husbandry, and consists of fleeces drawn from many of the best flocks in Queensland.

Besides these high-quality wools, fleeces from small holdings are shown, which are little inferior to the best. These are instructional, inasmuch as they indicate that no man having good sheep need despair of producing wool of equal quality.

The panels of the Wool Pagoda are designed to show the geological features of the different parts of Queensland, as far as wool-production is concerned. Mulga wools, blacksoil wools, "desert" wools, are shown on these; the bright scoured wools being merely decorative.

A number of photographs of sheep, possessed by the Department, are also shown by way of illustration.

Some of the stages of cloth manufacture may be seen on the walls of the Wool kiosk, the whole Exhibit, in short, having been designed for instructional rather than for spectacular purposes.

## ENTOMOLOGY AND PLANT PATHOLOGY.

Another division of the Department's activities is illustrated by three trophies in which are displayed—(1) A series of life histories of selected destructive insects; (2) Certain typical examples in the classes

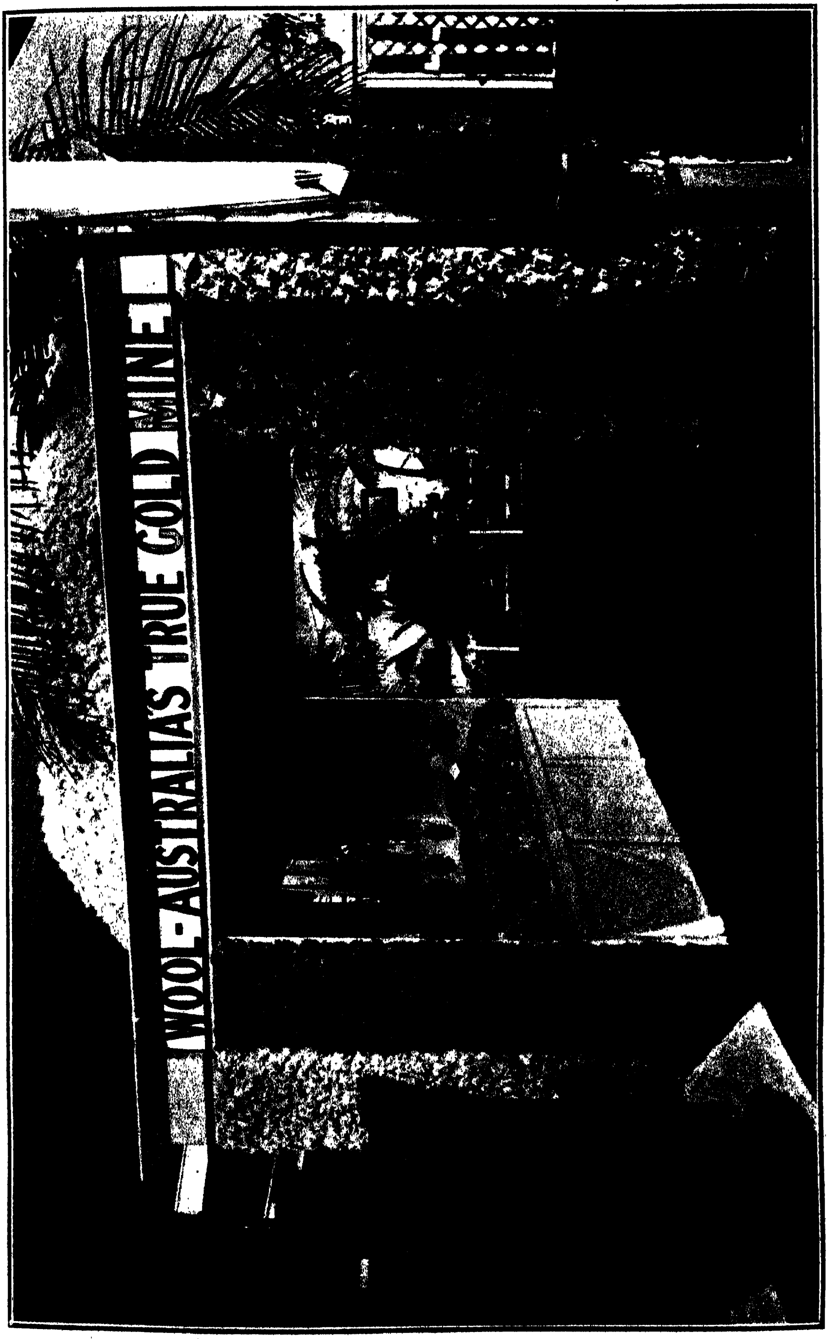



PLATE 58.—DEPARTMENTAL COURT (AGRICULTURE AND STOCK), SHOWING WOOL, FRUIT, SUGAR-CANE, AND MILLET EXHIBITS, NATIONAL AGRICULTURAL SHOW, BRISBANE, 1914.


PLATE 59.—DEPARTMENTAL COURT (AGRICULTURE AND STOCK), ENTOMOLOGICAL AND VEGETABLE PATHOLOGICAL EXHIBIT, NATIONAL ASSOCIATION SHOW, BRISBANE, 1914.

Butterflies, Moths, and Beetles (systematically arranged); and (3) The diseases of Fruits and Vegetables. It comprises cases devoted to the following objects:—(*a*) Insect Enemies of Citraceous Plants; (*b*) Insect Enemies of Citraceous Plants, Scale Insects only; (*c*) Branch-cutting Borer of Orange; (*d*) Prodenia Cut Worm; (*e*) Army Worm; (*f*) Potato Lady Bird Beetle; (*g*) Potato Flea Beetle; (*h*) Potato Mining Caterpillar; (*i*) Sweet Potato Weevil; (*j*) Sweet Potato Web Worm; (*k*) Cabbage Diamond Moth, Cabbage Godara Moth, Cabbage Hellula Moth; (*l*) Pumpkin Beetle; (*m*) Bean Fly and Fruit Fly; (*n*) Grain Moth and Maize Moth; (*o*) Flour Moth.

The second exhibit referred to includes only the commoner insects of the classes mentioned, also a case containing stick and leaf insects, and are such as the entomologist commonly encounters.

The third embraces a case illustrating the notorious Potato Blight and its parasite, and, in addition, numerous examples of disease-affected plants that admit of being displayed in glasses, in fluid—all having descriptive labels attached.

The same division of the Department is also responsible for a very fine exhibit of the Insectivorous Birds of the Moreton District, each bird having one (or more, where plumage variation is a feature) case devoted to it, there being about 150 cases in all.

## DIVISION OF BOTANY.

There are some 200 kinds of grasses representative of all parts of the State exhibited in this section by the Colonial Botanist.

The collection is similar to that shown last year, but has been added to as good samples have become available. The Mitchell Grasses (*Astrebla pectinata vars.*) are represented by four kinds, and special attention might be drawn to the Curly Mitchell (*Astrebla pectinata, var. curvifolia*), undoubtedly one of the finest of our Western pasture grasses.

Of the genus Andropogon, twelve kinds are shown, among which might be mentioned the Blue Grass (*A. sericeus*)—generally looked upon as one of the best of our indigenous grasses—and the Satintop (*A. erianthoides*).

Three forms are shown of the Kangaroo Grass (*Anthistiria ciliata*)—the common Kangaroo Grass of Southern Queensland; a glaucous (*i.e.*, bluish) form; and the common tropical one, which is of a straggling, entangling habit. *A. frondosa* is a Northern species, much coarser than the Kangaroo Grass. To the same genus belongs the tall Oat Grass of our Downs country (*A. avenacea*).

The extensive genus Panicum is represented by nearly 40 kinds; the genus Chloris (Star and Rhodes Grasses) by 8; Eragrostis or Love Grasses by 11; Eriachne by 7; Setaria by 6; and Sporobolus by 11 sorts.

Two grasses of special mention as growing under trees and relished by stock are—*Eleusine aristata*; and *Microlaena stipoides*, or Meadow Rice Grass. Other grasses shown, that form a sward under trees, are *Olismenus compositus*, *Panicum pygmaeum*, and *P. tenuissimum*.

Grasses forming a useful pasture in salt-water swamps are—*Paspalum distichum, var littorale;* and *Sporobolus virginicus,* and its variety *minor.*

Of special use in wet or damp places are *Leersia hexandra* (Rice Grass); *Oryza sativa* (the normal form of the cultivated rice); *Panicum crus-galli*; *P. proliferum*; *Hæmarthria compressa*; and *Chamæraphis spinescens.* This latter is especially useful, for, as the waterholes dry up, its floating runners rest upon the land, root from the nodes, and cover with nutritious grass spots that would otherwise be bare.

The following kinds exhibited are found growing over our coastal sand dunes:—*Eragrostis Brownii,* var. *interrupta; Spinifex hirsutus* (Rolling Grass); *Stenotaphium subulatum*; and *Zoysia pungens* (the coast Couch).

A new feature will be observed in the exhibit of weeds and suspected poisonous plants, the collection containing a little over 50 species. A very large number of our plants are recorded as poisonous which at times form good herbage; and of very few have we positive knowledge of their poisonous character.

Amongst those shown are the Wall Flower Poison Bush (*Gastrolobium grandiflorum*) and Ironwood (*Erythrophlæum Laboucheri*), two leguminous plants reckoned as amongst the most poisonous we have; *Passiflora spp.* (Wild Passion Vines) (these at times cause the death of stock that may browse upon them); *Lobelia purpurascens* and *Pratia erecta* (two small weeds of the natural order Campanulaceæ, which are poisonous to stock); *Eremophila maculata,* the well-known Fuchsia Bush; the Noogoora Burr (*Xanthium strumarium*); the Caustic Creeper (*Euphorbia Drummondii*); the Scrub Poison Tree (*Excæcacia Dallachyana*); *Pimelea hæmatostachya,* generally looked upon as poisonous to sheep; the Stagger Weed (*Stachys arvensis*), reputed as harmful to working cattle and horses; the Inkweed (*Phytolacca octandra* and *P. decandra*); and others.

## WHEAT AND WHEAT-MILLING EXHIBIT.

This occupied the full length of the Court (88 ft. on the Gregory terrace wall); and its features cannot but be impressive of the fact that the oft-repeated statement that Queensland is not a wheat-growing country is entirely without foundation.

In the arrangement of this section, a special display has been made within the central and more prominent architectural feature, a large porch, to demonstrate that prolific yields of good quality grain predominate in the State. In the background is an arch of wheat and scroll work decoratively arranged with wheat-straw and ears in Egyptian character, opening to the view an actual scene on the Hermitage State Farm, where fields of ripening grain form a pleasing setting for a Cornucopia from which large quantities of grain (actually grown on the field in question) are being poured out in such a way as to spread expansively over the edge of the fields in the foreground of the picture, emblematically representing the bountiful yield of grain obtaining in

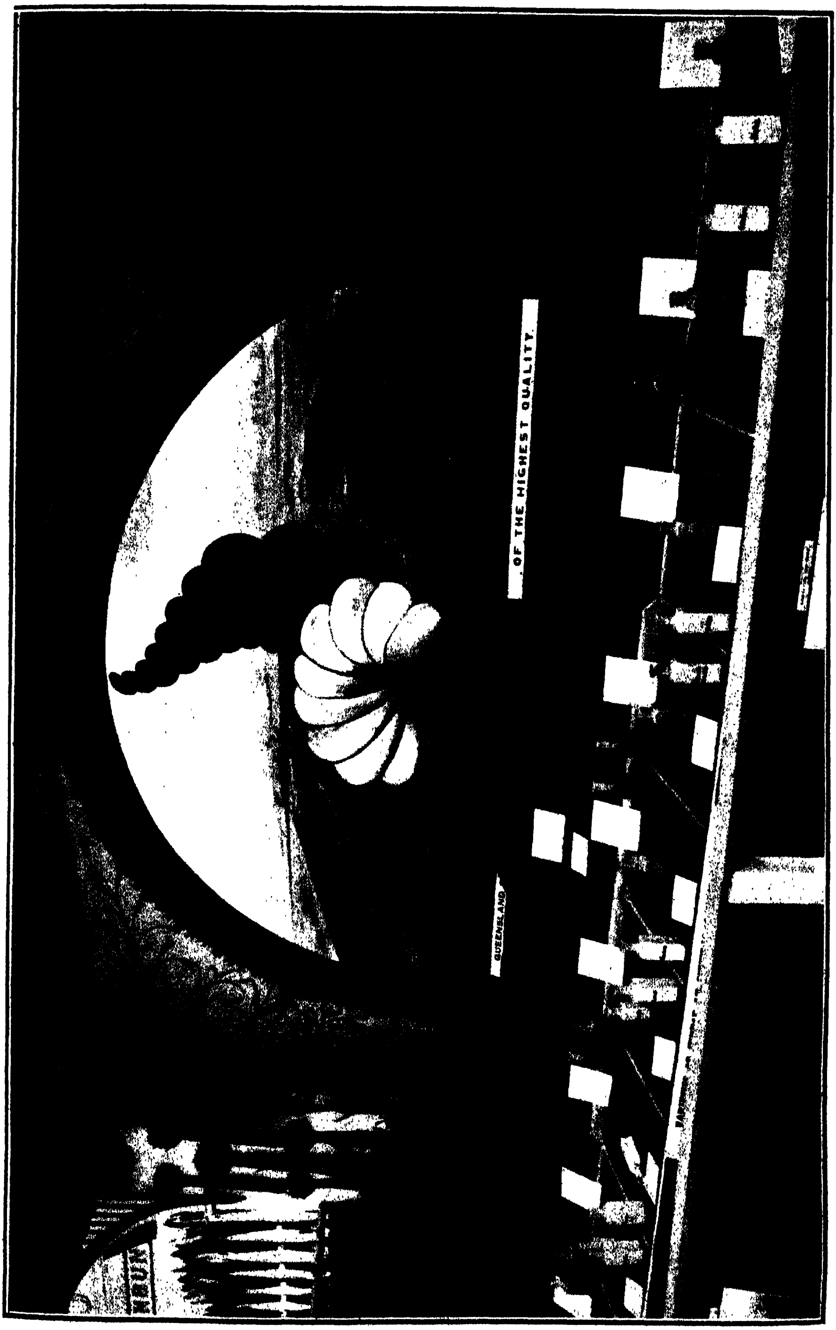



PLATE 60.—WHEAT EXHIBIT, DEPARTMENTAL COURT (AGRICULTURE AND STOCK), N.A. SHOW, BRISBANE, 1914.

the State. Flanking the scene on either side are two "stooks" of sheaves, the latter banded with straw, and a representation of an edge of a field of wheat, the whole arrangement serving to accentuate the subject-matter depicted in the rural scene. On the pilasters supporting the porch are a number of panoramic photographs of typical harvest fields and scenes on the Darling Downs, as well as statistical information setting out individual district and aggregate yields of grain; these are accompanied by a rainfall map on which the "wheat belt" of the State is shown. This latter indicates, at a glance, the immense tract of country within which wheat has been successfully produced. Here the Clermont district is shown as the most northerly locality, the boundary line extending southerly and easterly through Comet across to the Upper Burnett and to Gayndah, thence to Nanango, to Crow's Nest, through Toowoomba, along the Range to Killarney. From this point the boundary extends westerly along the Severn (or McIntyre and Barwon Rivers) frontages to Dirranbandi. Leaving this place, the Maranoa River is traversed northerly, crossing the Main Western Line approximately at Mungallala, and thence by a line to Clermont to junction again with the starting point. There is, however, good reason to anticipate that the boundary already mentioned might be extended in a north-westerly direction from Clermont towards Hughenden and southwards to Aramac, Barcaldine, Blackall, Charleville, to the Southern border.

Another feature of the Cereal Exhibit comprises full-length samples of wheat plants, root, stem, and ears, drawn from six stud wheat plots established last season by the Department at Mitchell, Wallumbilla, Dulacca, Kaimkillenbun, Goomburra, and Inglewood, the samples from each place respectively occupying 100 sq. ft. of wall space. Grain of each variety is also shown in glass, in close proximity to the specimen plants. Interesting comparisons can be made as to the behaviour of individual varieties of wheat raised under varying conditions. In the collection are some 20 odd new crossbred wheats raised at the Roma State Farm, also several named varieties common to other States and to Queensland. The exhibit is interspaced with photographs of stud wheat plots, illustrating the various phases incidental to the testing of different varieties of wheat before their introduction into general cultivation.

Another section of the Cereal Exhibit deals with named varieties in favour throughout different districts of the State. Some 50 odd separate samples will be on view, and, in some instances, comparison can be made between several of the same kinds of wheat drawn from different localities. A description of the field characteristics and full details of the milling tests, with an analysis of each, appear on separate cards.

In reference to what the Department of Agriculture and Stock is aiming at in the milling of wheats, it may be explained that, in order to find the most suitable and profitable varieties to grow in any district, one of the chief points to consider is the suitability of such for milling purposes.

To judge wheat simply on appearance of grain, weight per bushel, &c., is more or less guesswork.

The ultimate aim is always to produce a good bread wheat which, at the same time, has to give, from the farmer's point of view, a heavy yield, which will stand well, and have a good resistance against disease.

The miller again desires a wheat fairly easy to mill, producing a good yield of flour, which, in order to satisfy the baker, must have good strength and colour, and yield on baking a shapely, well-risen, nutritious, and white loaf. The importance of nutrition is, however, often overlooked by the public in their desire for white colour and appearance.

The milling quality of a wheat is, therefore, judged by points on the following determinations carried out in the Laboratory:—

1. Appearance of grain.
2. Weight per bushel in pounds.
3. Ease of milling.
4. Percentage of flour obtained.
5. Colour of flour.
6. Percentage of gluten in flour.
7. Strength of flour expressed in quarts of water per sack of 200 lb. of flour.

In any variety these points will be largely influenced by locality and season, but still characteristic features are generally maintained to a large extent.

In the milling carried out at the Agricultural Laboratory, the process of milling, as practised in flour mills, is followed as closely as it is possible on a small scale, and the results compare favourably with practical milling.

The process is briefly the following:—

> The cleaned wheat is washed, dried, and submitted several times to two sets of break rollers—one with coarse and the other with fine-cutting grooves, separating the products, after passing through various sieves in the bolting box, into bran, pollard, semolina, and break flour. The semolina is now passed several times through a set of smooth rollers, gradually getting them set closer and closer, the milling products passing through the sieves until finally the whole are separated into flour, pollard and bran. The products are weighed, and the flour submitted to the various analytical tests, on which points are given.

The Cereal Exhibits, *in toto*, offer unique acquisitive information on the subject, and will serve to demonstrate, in no uncertain way, that more attention should be given to the raising of the all-important grain.

## DRY FARMING EXHIBIT.

This section has been designed for the purpose of illustrating experiment work carried out at the Roma State Farm, where Variety, Fertiliser, Rotation, and Cultivation Tests have been carried out for several years.

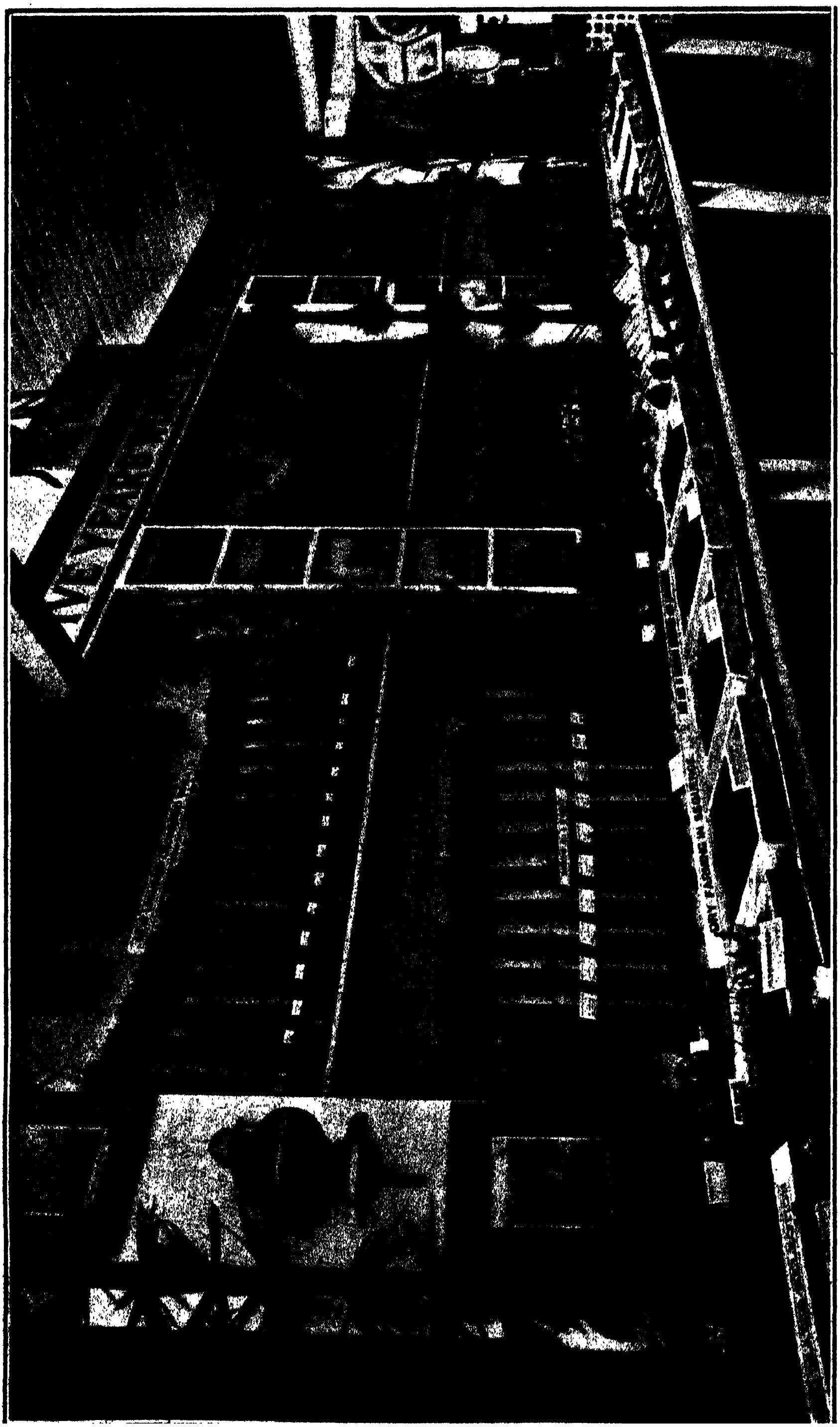


PLATE 61.—DRY FARMING EXHIBIT (ROMA), DEPARTMENTAL COURT (AGRICULTURE AND STOCK), N.A. SHOW, BRISBANE, 1914.

It is now possible to make deductions from the data available, and in every instance last season's yields are shown in comparison with the averages obtained for the respective periods during which the experiments have been conducted.

The results at the State Farm, when compared with the average returns for the Maranoa district, where low yields obtain, are eloquent of the value of good cultural methods, and no more forcible argument is needed to indicate that, if farmers only give the necessary attention to systematic cultivation, the present output of 84,000 odd bushels of wheat per year could be readily increased to a quarter of a million from the same area of ground.

Comment on this fact only accentuates the loss which individual farmers are suffering.

Dry farming is merely an applied term, and to give effect to its application simply means that common-sense methods, based on scientific principles, must be consistently observed in the preparation and treatment of the soil.

With the object of demonstrating the routine which should be followed in farm practice, a number of sample boxes have been prepared to illustrate (in conjunction with appropriate descriptions) the field operations incidental to giving effect to the system to ensure success.

## WHEAT-BREEDING EXHIBIT.

The cross-fertilisation of wheats is one of the principal features at this Farm; and numbers of samples, descriptive of the evolution of a new variety of wheat, are shown on a series of large panel screens in Mendelian character.

## COWPEA-BREEDING EXHIBIT.

This section of work is corollary to the wheat-breeding work, and similar screens are on view by way of illustration; in another part of the Court a special exhibit has been prepared, where full-size samples of plants, raised in the process of cross-fertilisation, are shown alongside of their respective parents. Photographs of the plants in question are hung in close proximity, and ready comparisons can be made as to the remarkable differences obtaining from this important branch of work.

## MAIZE EXHIBIT.

The premier position attained by this grain in Queensland is sufficient to give colour to the title claimed for it in the trophy on exhibition. Here it is known as "The King of Grains"; and this distinction is emphasised in the arrangement of the central feature of the wall decorations, the Queensland Badge ("A Maltese Cross and Crown" with the word "Queensland" beneath), worked up in appropriate character; the jewels in the Crown being represented by different kinds of grain specially selected for their shape and colour.

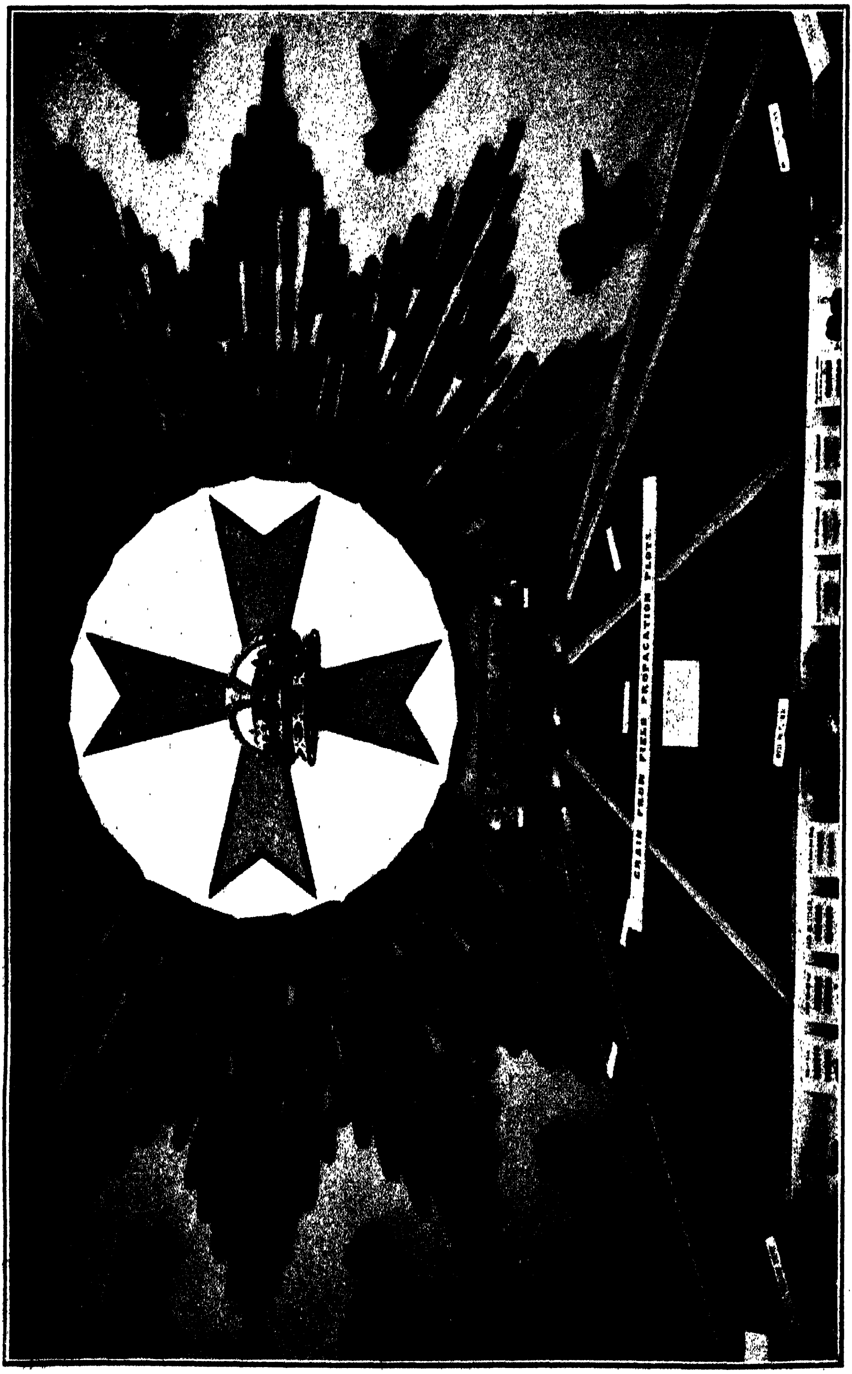



PLATE 62.—MAIZE EXHIBIT, DEPARTMENTAL COURT (AGRICULTURE AND STOCK), NATIONAL ASSOCIATION SHOW, BRISBANE, 1914.

A large mass of grain surmounting the "Badge," so arranged as to represent the radiations from the Crown, has been fixed in close proximity.

Below the "Cross and Crown" is a large pyramid of grain, divided up into sections, each of which contains a different kind of maize. These latter samples have been drawn from the Departmental seed propagation plots, and are typical of the grain being offered for sale this year to the farmers of Queensland for the purpose of improving the standard of quality and of the productivity of this cereal in the State.

## ANIMAL PATHOLOGY AND BACTERIOLOGY.

In the Exhibit from the Stock Experiment Station at Yeerongpilly will be found numerous museum specimens illustrating various manifestations of diseases discovered in Cattle, Sheep, Swine, and other animals; also, a collection of sections of pathological tissues, micro-specimens, and tube cultivations of various micro-organisms associated with animal disorders.

The principal items of interest displayed in the Exhibit are the following:—

TUBERCULOSIS.—Manifestations of the disease in different domesticated and wild animals, showing lesions in the Lungs, Liver, Spleen, Lymphatic Glands, Bones of the Back and Limbs, Omentum, Mesentery, and Intestines.

ACTINOMYCOSIS (Lumpy Jaw).—Growths of this disease affecting the Upper and Lower Jaw, Tongue, Flanks, Scrotum, Lungs, and Liver. *Note.*—This disease sometimes resembles and may be mistaken for Tuberculosis.

PLEURO-PNEUMONIA.—Lungs showing typical marbled appearance, enlarged Lymphatic Glands.

TICK FEVER.—Spleen, Liver, and Kidneys showing characteristic *post-mortem* lesions; Blood Smears stained to show Tick Fever organisms.

TICKS.—This collection illustrates ticks in various stages of development on the skin of cattle, sheep, and horses. Specimen glasses containing ticks in all stages of their life history—fully developed males and females, eggs, larval ticks, and nymphs.

BLACKLEG.—Portion of the affected muscle taken from calves and sheep, showing the dark-coloured tissue with pronounced effusion of serous fluid and gas formation.

SWINE FEVER.—Specimens of the Stomach and Intestines showing the typical ulceration of the inside lining membrane.

MALIGNANT GROWTHS.—Including Cancer, Epithelioma, Carcinoma, Sarcoma, Exostosis, Osteoporosis, &c.

INTERNAL AND EXTERNAL PARASITES.—These include Flukes, Hydatids, Tape Worm, Round Worm, Thread Worm, Worm Nodules in Beef, Larvæ of the Warble Fly, Bots, Acari, Lice, and Ticks.

A COLLECTION OF HAIR BALLS found in the stomach of healthy Cattle, Horses, Sheep, Pigs, Dogs, and Cats.

DISEASES OF POULTRY—Dealing with Chicken Cholera, Fowl Enteritis, and Diphtheria; and Parasitic Diseases, as Scaly-Leg, and the Red Mite which is the cause of Warts.

## ECONOMIC AGRICULTURAL BACTERIOLOGY.

Under the heading of what may be termed "Economic Agricultural Bacteriology," there is an interesting and varied display, including the following:—

Vaccines, Viruses, and Serums prepared at the Laboratory at Yeerongpilly, and used successfully in the prevention of the respective animal diseases. These include Blackleg Vaccine, Pleuro-Pneumonia Virus, Blood Serum for Tick Fever, and Auto-vaccine for Sepsis and Contagious Mammitis.

Appliances necessary for use in connection with the preparation and the inoculation of Blackleg Vaccine, Tick Fever Blood, Pleuro-Pneumonia Virus, &c.

Cultures of Lactic Acid Ferment now being used extensively in the ripening of cream and milk in various butter and cheese factories.

Plate and Tube Cultivations of micro-organisms illustrating method of bacteriologically examining water supplies for meatworks, butter and cheese factories, and various articles of fresh, preserved, and canned foods.

*Pure Cultivation of Disease-producing and Harmless Organisms Growing in Tubes of Artificial Nutrient Media—*

Tubercle Bacilli (Consumption Germs), Human and Bovine.
Malignant Oedema.
Blackleg.
Anthrax.
Coli Communis.
Typhoid Fever.
Canine Distemper.
Pus-producing Organisms.
Chicken Cholera.
Fowl Enteritis.
Locust Fungus.
Lactic Acid.
Butyric Acid.

Also, a number of Colour-producing Bacteria and Mould Fungi.

## DAIRYING.

Next to the pastoral and sugar-growing industries must be ranked that of dairying, which continues to make remarkable headway. It has long been recognised that the most successful farmers of the present day

are those who have not got all their eggs in one basket; hence, those who combine dairying, pig-breeding, &c., find themselves, at the year's end, in a better financial position than their neighbours who devote their energies to one class of farming only, the exception being notably the sugar growers.

Noting the phenomenal progress made in the dairying industry of this State during the last few years, it reflects the greatest credit upon those engaged in it, and proves, beyond question, the suitability of the climate, soil, and crops, from South to Far North, for the production of an article for which there is an unlimited demand in London and elsewhere—butter.

## FRUIT EXHIBIT.

This has been prepared with the object of drawing attention to the natural advantages possessed by this State for the production of high-class marketable fruit for local consumption and for export. The different kinds shown are drawn from the North and South Coast fruit-growing centres, and represent the chief fruits now in season.

Almost every fruit known can be produced here on account of the wide range in climate common to different parts of the State. The Granite belt in the Stanthorpe district is as justly famed for its temperate fruits (now out of season) as the Southern, Northern, and other districts are for the kinds adapted to sub-tropical and tropical conditions.

Fruit-growing is attracting considerable attention, and much development work is now taking place. To be successful, an intimate acquaintance with and a knowledge of the work ar indispensable.

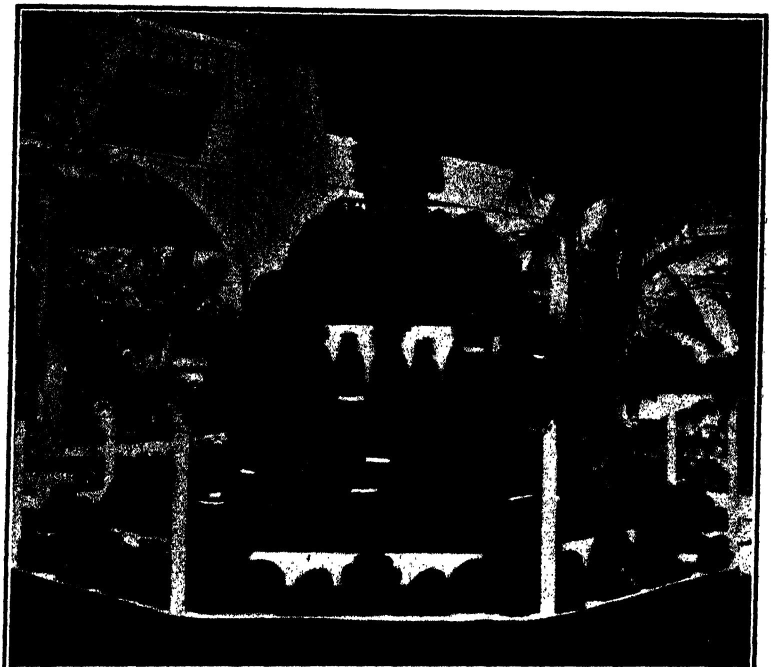
The production of grapes for the year 1913 shows a decided increase over that of the previous season, some four million odd pounds having been gathered in 1913 from an area of 1,450 acres in bearing.

The various influences at work in the banana trade seem to have effected a reduction in the Northern output. Here the growers have curtailed operations, owing principally to the difficulty which has been experienced in the carrying and marketing of the fruit, and to the competition from the Fijian Islands.

In the Southern part of the State, the districts where our chief supplies of bananas are grown are the Blackall Range (which includes Palmwoods, Landsborough, Montville, Maroochy), Buderim Mountains, Samford, North Pine, Redland Bay, Cleveland, and Mount Cotton.

Pineapples are being largely cultivated, and the demand for suitable land is ever on the increase. The year's export of this fruit also shows a considerable advance. The various canning factories absorb large quantities of this fruit, and a large trade in canned pines has sprung into existence. The area under pines in 1913 was 3,014 acres, which produced 744,906 dozen pineapples.

1



2

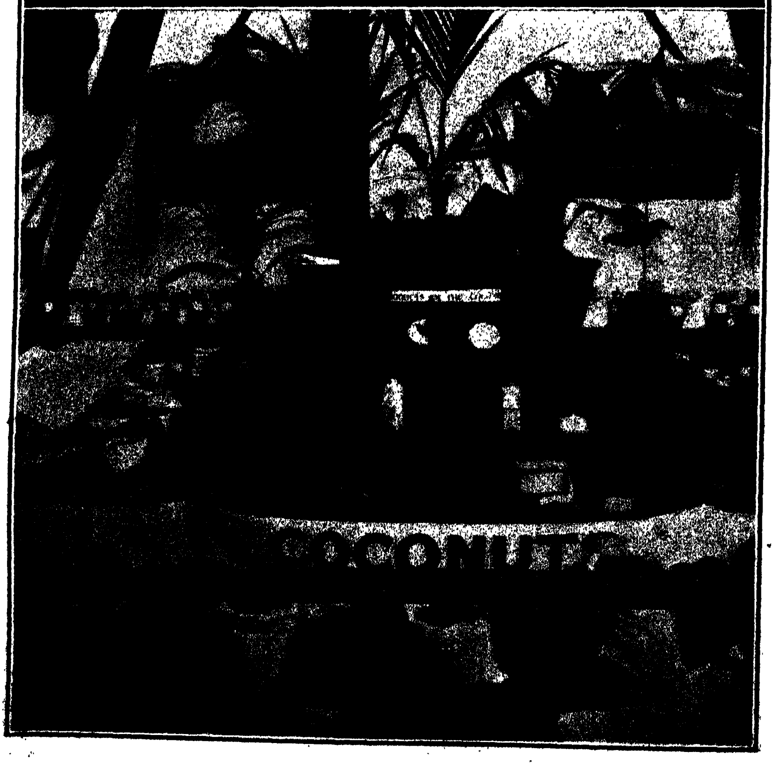


PLATE 63.—1. FRUIT EXHIBIT. 2. COCONUT EXHIBIT.
DEPARTMENTAL COURT (AGRICULTURE AND STOCK), N.A. SHOW, BRISBANE, 1914.

Apple-growing in the Granite belt is coming into much favour. In the Stanthorpe district 1,522 acres are planted; this area representing 95 per cent. of the total under apples in the State; 2,768 acres represent the area (other than those already mentioned) under miscellaneous fruits in the State.

Custard Apples and Papaws are finding a ready and increasing sale locally and in Sydney, and bring in remunerative returns to orchardists who may be conveniently situated for producing such fruits.

## BROOM MILLET.

Although the demand for the particular variety of sorghum called "Broom Millet" cannot be said to be unlimited in this State, yet, in so far as a local demand exists in Brisbane for broom-making, it should be noted that the demand is far greater than the supply. The broom manufacturers have never been able to obtain sufficient for their requirements from the farmers within the State, and hence have been obliged to import largely from America and New South Wales. Why should not all the fibre needed for broom manufacture in Queensland be grown within the State? The natural inference is—either that broom millet is not a paying crop, or that other crops and dairying are more profitable.

The yield from a crop of "Broom" Millet reaches 600 lb. of "broom" and 1,500 lb. of seed per acre. Three months later, in favourable seasons, a second or ratoon crop can be harvested, which may yield an additional 400-500 lb. of fibre.

## TOBACCO EXHIBIT.

The samples on exhibition have been drawn from the two chief tobacco-growing districts in the State—Inglewood and Bowen. The former locality is noted for the production of Pipe, and the latter for Cigar leaf. Cigarette leaf, grown at Inglewood, is also shown.

Seven hundred and thirty-one acres were cropped with Tobacco last year, and gave a return of 570,271 lb. of dried leaf, nearly double the amount secured from the 1912 crop.

More care in the production and handling of the leaf is now taken than formerly, and this has effected a general improvement in quality.

## INDUSTRIAL WORK.

The exhibit of harness and blacksmithing, from the Queensland Agricultural College, Gatton, serves to illustrate a section of the activities at this Institution, where instructional work in these and other technical subjects is given by competent Instructors.

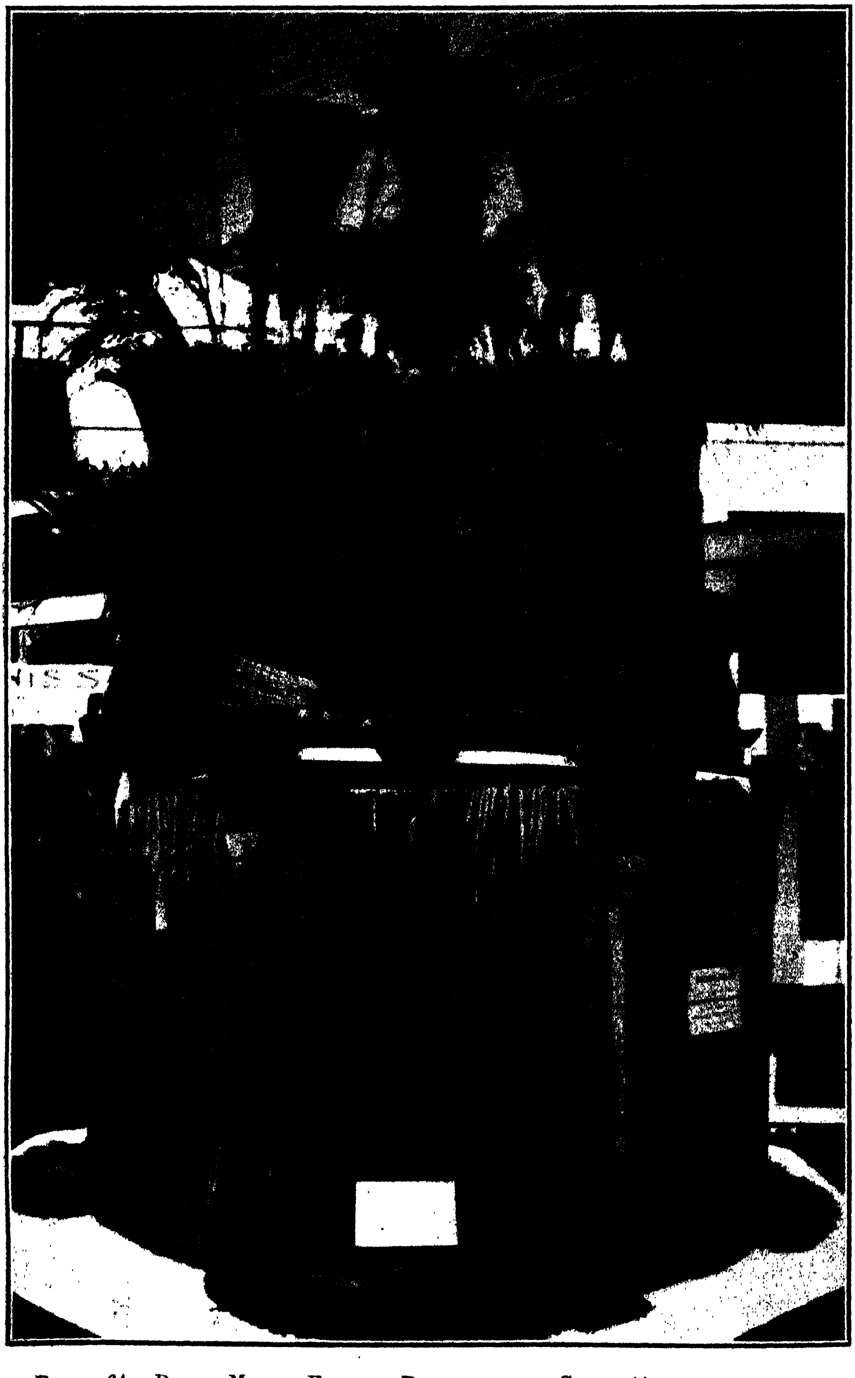


PLATE 64.—BROOM MILLET EXHIBIT, DEPARTMENTAL COURT (AGRICULTURE AND STOCK), N.A. SHOW, BRISBANE, 1914.

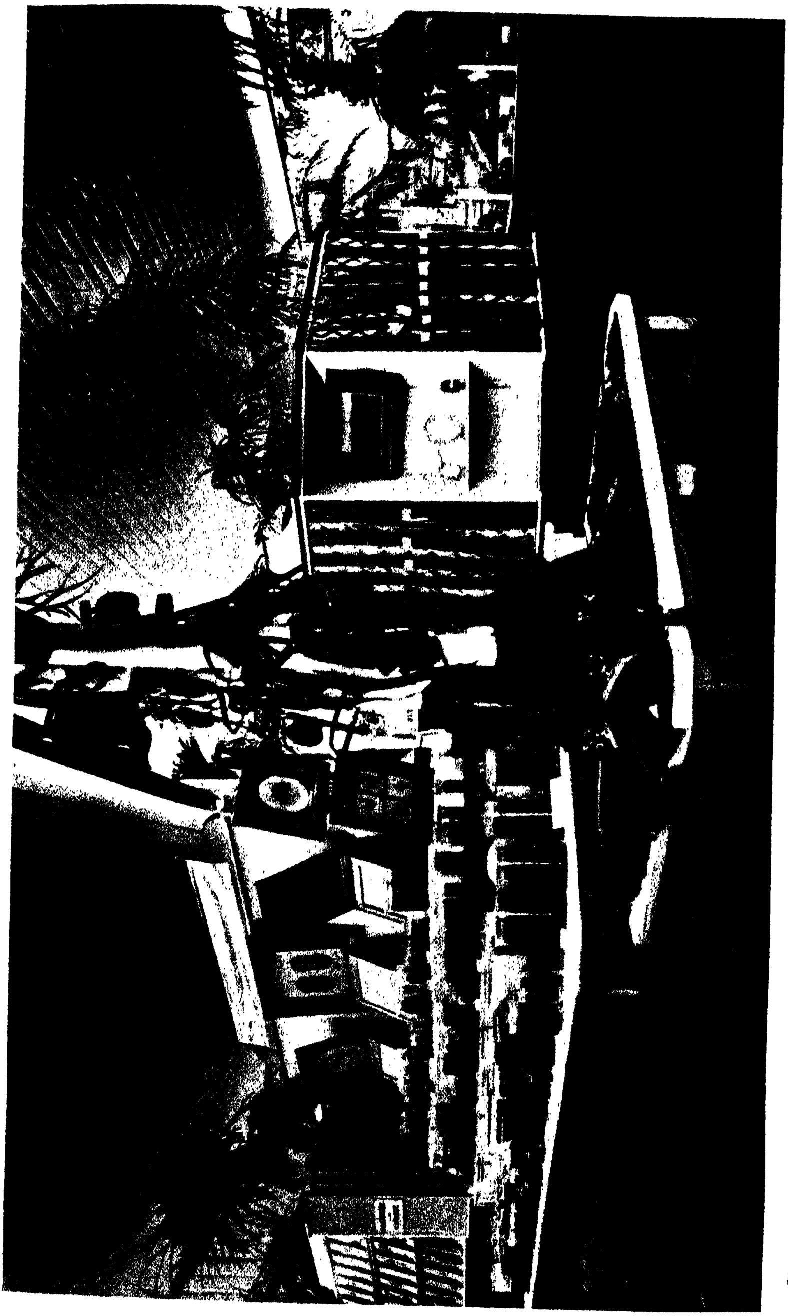


PLATE 65.—DEPARTMENTAL COURT (AGRICULTURE AND STOCK), SHOWING STOCK INSTITUTE, SUSPECTED POISONOUS PLANTS, SADDLERY, AND SUGAR-CANE EXHIBITS, NATIONAL ASSOCIATION SHOW, BRISBANE, 1914.

# Pastoral.

## THE NASAL FLY.

### (*OESTRUS OVIS.*)

BY W. G. BROWN, Sheep and Wool Expert.

In December, 1913, a warning was published to pastoralists through the "Queensland Agricultural Journal." Since that time numerous grubs of the abovenamed fly have been forwarded to the Department of Agriculture and Stock from nearly every part of the Darling Downs for identification. In all cases they have been identified as the Nasal Fly Grub. I saw them first at Cambooya on the late Mr. T. R. Bodkin's place. Then I heard of them at Warwick, within a few miles of Toowoomba (Mr. Luke, M.L.A., my informant).

In December last year I saw hundreds of these flies at Mr. Chappell's place at Pikedale. Last month a specimen was sent from a station near Mungindi, on the South-western border. Consequently, it may safely be said that the whole Downs is infested with this pest.

In the warning to pastoralists, published last December after my visit to Mr. Chappell's place, I stated that the Sheep Bot Fly resembles the common house fly, but is much larger. It is covered with small round spots. The abdomen bears velvety brown and straw-coloured hairs. The maggots are of a white colour with brown spots on the anterior segment. The eggs are deposited within the nostrils of the sheep. After hatching, the larvæ penetrate deeply into the nasal cavity, and after becoming full grown they fall to the ground, pupate, and finally emerge as fully grown flies. In the earlier stages the maggots may be dislodged with a feather dipped in turps and inserted into the nostrils of the sheep. Tar or whale oil smeared on the nostrils of the sheep will tend to keep the fly away.

The signs that the fly is active are:—Restlessness, stamping, and the holding of their heads against other sheep or in the dust. The time of the attack of the flies in other countries is the autumn, but in this State they seem to fly all the year round. A sheep's head was recently brought into this office which showed grubs in all stages of maturity. It is necessary that, throughout the whole of Queensland, pastoralists should keep their eyes open and stop this pest, if they can, in the early stages.

In June, 1910, a report of the Stock Branch of the Department of Agriculture, Sydney, stated that as long ago as 1904 Mr. Froggatt, the Government Entomologist, pointed out the serious pest which the Blow Fly might become if no steps were taken to limit its prevalence. This equally applies to the Nasal Bot Fly. In this report Mr. Froggatt states:—

> "The Nasal Sheep Fly (*Oestrus ovis*), an introduced pest, known in Europe and other countries, is another serious sheep pest that was reported to be killing sheep, chiefly in the Blue Mountains at Megalong and Lithgow. I visited Megalong and

Gaylong in November and examined a number of animals, but could find no outward signs of the fly, though several sheep that had been killed previously had been found to have maggots in the cavities of the nose. This parasite is probably much more common in flocks than is suspected, but as sheep's heads are so seldom used in the country, they are not observed, and sheep may often die from nasal fly without the cause being known."

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# Statistics.

## RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JULY, 1913 AND 1914, FOR COMPARISON.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|
| | July. | No. of Years' Records. | July, 1914. | July, 1913. |
| *North Coast.* | In. | | In. | In. |
| Atherton ... ... | 0·89 | 13 | 0·39 | 0·54 |
| Cairns ... ... | 1·14 | 27 | 0·35 | 1·46 |
| Cardwell ... ... | 1·39 | 27 | 0·25 | 0·07 |
| Cooktown ... ... | 0·83 | 27 | 1·47 | 1·40 |
| Herberton ... ... | 0·57 | 27 | 0·37 | 0·45 |
| Ingham ... ... | 1·50 | 22 | 0·90 | 0·26 |
| Innisfail ... ... | 4·13 | 27 | 1·27 | 2·41 |
| Mossman ... ... | 1·54 | 5 | 0·81 | 0·89 |
| Townsville ... ... | 0·50 | 30 | 0·08 | Nil |
| *Central Coast.* | | | | |
| Ayr ... ... ... | 0·49 | 27 | Nil | Nil |
| Bowen ... ... | 0·67 | 27 | Nil | Nil |
| Charters Towers ... | 0·47 | 27 | 0·48 | Nil |
| Mackay ... ... | 1·34 | 27 | Nil | 0·24 |
| Proserpine ... ... | 0·94 | 11 | Nil | 0·01 |
| St. Lawrence ... | 1·26 | 27 | 0·03 | 0·20 |
| *South Coast.* | | | | |
| Crohamhurst ... | 2·85 | 20 | 2·61 | 7·12 |
| Biggenden ... ... | 1·39 | 14 | 0·41 | 0·68 |
| Bundaberg ... ... | 2·20 | 27 | 0·62 | 1·26 |
| Brisbane ... ... | 2·32 | 63 | 2·03 | 2·40 |
| Childers ... ... | 1·76 | 19 | 0·99 | 1·61 |
| Esk ... ... ... | 2·11 | 27 | 0·88 | 1·25 |
| Gayndah ... ... | 1·65 | 27 | 0·55 | 1·58 |
| Gympie ... ... | 1·97 | 27 | 1·36 | 3·30 |
| Glasshouse M'tains | 2·65 | 6 | 2·52 | 4·50 |
| Kilkivan ... ... | 1·87 | 27 | 1·58 | 0·35 |
| Maryborough ... | 2·13 | 27 | 0·68 | 2·26 |

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|
| | July. | No. of Years' Records. | July, 1914. | July, 1913. |
| *South Coast—continued:* | In. | | In. | In. |
| Mount Larcom ... | ... | ... | 0·19 | ... |
| Nanango ... ... | 1·76 | 27 | 1·29 | 0·65 |
| Rockhampton ... | 1·58 | 27 | 0·08 | 0·33 |
| Woodford ... ... | 2·73 | 27 | 2·46 | 3·03 |
| Yandina ... ... | 2·77 | 21 | 2·41 | 6·14 |
| *Darling Downs.* | | | | |
| Dalby ... ... | 1·84 | 27 | 1·24 | 1·05 |
| Emu Vale ... ... | 1·50 | 17 | 1·12 | 0·32 |
| Jimbour ... ... | 1·86 | 24 | 1·23 | 0·68 |
| Miles ... ... | 1·69 | 27 | 1·94 | 0·61 |
| Stanthorpe ... | 2·04 | 27 | 1·02 | 1·27 |
| Toowoomba ... | 2·06 | 27 | 1·76 | 1·01 |
| Warwick ... ... | 1·83 | 27 | 0·97 | 0·82 |
| *Maranoa.* | | | | |
| Roma ... ... | 1·40 | 25 | 1·04 | 0·46 |
| *State Farms, &c.* | | | | |
| Gatton College ... | 1·51 | 14 | 1·00 | 0·44 |
| Gindie ... ... | 1·23 | 13 | 0·35 | Nil |
| Kamerunga Nurs'y | 1·35 | 23 | 0·55 | 0·68 |
| Kairi ... ... | ... | ... | 0·58 | 0·38 |
| Sugar Experiment Station, Mackay | 1·36 | 16 | Nil | 0·58 |
| Bungeworgorai ... | ... | ... | 1·18 | 0·35 |
| Warren ... ... | ... | ... | 0·13 | 0·31 |
| Hermitage ... | 1·49 | 7 | 0·78 | 0·62 |

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for July this year and for the same period of 1913, having been compiled from telegraphic reports, are subject to revision.

# Dairying.

## THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF JULY, 1914.

| Name of Cow. | Breed. | Date of Calving. | Total Milk. | Test. | Commercial Butter. | Remarks. |
|---|---|---|---|---|---|---|
| | | | Lb. | % | Lb. | |
| Auntie ... | Ayrshire ... ... | 26 June, 1914 | 1,015 | 3·5 | 41·57 | |
| Lady Margaret | ,, ... ... | 19 June ,, | 913 | 3·8 | 40·68 | |
| Lady Melba | Holstein ... ... | 6 Mar. ,, | 854 | 3·8 | 38·02 | |
| Bluebelle ... | Jersey ... ... | 27 May ,, | 779 | 3·7 | 33·75 | |
| Miss Edition | ,, ... ... | 10 July ,, | 675 | 3·8 | 30·05 | |
| Bee ... ... | ,, ... ... | 3 July ,, | 674 | 3·8 | 30·00 | |
| Lady May ... | Ayrshire ... ... | 4 May ,, | 691 | 3·5 | 28·28 | |
| Gretchen ... | Holstein ... ... | 6 May ,, | 791 | 2·8 | 25·70 | |
| Miss Bell ... | Jersey ... ... | 25 Sept., 1913 | 373 | 5·6 | 24·68 | |
| Nina ... | Shorthorn... ... | 5 April, 1914 | 625 | 3·2 | 23·33 | |
| Cocoatina ... | Jersey ... ... | 20 April ,, | 424 | 4·2 | 20·92 | |
| Miss Melba | Holstein ... ... | 22 Jan., 1913 | 502 | 3·5 | 20·55 | |
| Lady Athel | Shorthorn... .. | 10 July, 1914 | 559 | 3·1 | 20·18 | |

Ration fed : 20 lb. sorghum ensilage, 2 lb. bran per cow.

## TIMES OF SUNRISE AND SUNSET AT BRISBANE—1914.

| Date. | SEPTEMBER. | | OCTOBER. | | NOVEMBER. | | DECEMBER. | |
|---|---|---|---|---|---|---|---|---|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. |
| 1 | 6·3 | 5·33 | 5·29 | 5·47 | 4·58 | 6·5 | 4·46 | 6·28 |
| 2 | 6·2 | 5·34 | 5·28 | 5·48 | 4·58 | 6·6 | 4·46 | 6·28 |
| 3 | 6·1 | 5·34 | 5·27 | 5·48 | 4·57 | 6·7 | 4·46 | 6·29 |
| 4 | 6·0 | 5·35 | 5·26 | 5·49 | 4·56 | 6·7 | 4·46 | 6·30 |
| 5 | 5·59 | 5·35 | 5·25 | 5·49 | 4·56 | 6·8 | 4·46 | 6·31 |
| 6 | 5·58 | 5·36 | 5·24 | 5·50 | 4·55 | 6·9 | 4·46 | 6·31 |
| 7 | 5·57 | 5·36 | 5·23 | 5·50 | 4·54 | 6·9 | 4·46 | 6·32 |
| 8 | 5·56 | 5·37 | 5·21 | 5·50 | 4·54 | 6·10 | 4·46 | 6·33 |
| 9 | 5·54 | 5·37 | 5·20 | 5·51 | 4·53 | 6·11 | 4·46 | 6·33 |
| 10 | 5·53 | 5·37 | 5·19 | 5·52 | 4·52 | 6·11 | 4·47 | 6·34 |
| 11 | 5·52 | 5·38 | 5·18 | 5·52 | 4·52 | 6 12 | 4·47 | 6·35 |
| 12 | 5·51 | 5·38 | 5·17 | 5·53 | 4·51 | 6·13 | 4·47 | 6·36 |
| 13 | 5·50 | 5·39 | 5·16 | 5·53 | 4·51 | 6·14 | 4·47 | 6·36 |
| 14 | 5·49 | 5·39 | 5·15 | 5·54 | 4·50 | 6·14 | 4·48 | 6·37 |
| 15 | 5·48 | 5·40 | 5·14 | 5·54 | 4·50 | 6·15 | 4·48 | 6·37 |
| 16 | 5·46 | 5·40 | 5·13 | 5·55 | 4·49 | 6·16 | 4·48 | 6·38 |
| 17 | 5·45 | 5·41 | 5·12 | 5·56 | 4·49 | 6·17 | 4·48 | 6·39 |
| 18 | 5·44 | 5·42 | 5·11 | 5·56 | 4·49 | 6·18 | 4·49 | 6·39 |
| 19 | 5·43 | 5·42 | 5·10 | 5·57 | 4·48 | 6·18 | 4·49 | 6·40 |
| 20 | 5·42 | 5·42 | 5 9 | 5·57 | 4·48 | 6·19 | 4·50 | 6·40 |
| 21 | 5·41 | 5·42 | 5·8 | 5·58 | 4·47 | 6·20 | 4·50 | 6·41 |
| 22 | 5·40 | 5·43 | 5·7 | 5·58 | 4·47 | 6·21 | 4·51 | 6·42 |
| 23 | 5·38 | 5·43 | 5·6 | 5·59 | 4·47 | 6·22 | 4·51 | 6·42 |
| 24 | 5·37 | 5·44 | 5 5 | 6·0 | 4·47 | 6·22 | 4·52 | 6·43 |
| 25 | 5·36 | 5·44 | 5·4 | 6·0 | 4·47 | 6·23 | 4·52 | 6·43 |
| 26 | 5·35 | 5·45 | 5·4 | 6·1 | 4·46 | 6·24 | 4·53 | 6·43 |
| 27 | 5·34 | 5·45 | 5·3 | 6·2 | 4·46 | 6·25 | 4·53 | 6·44 |
| 28 | 5·33 | 5·46 | 5·2 | 6·2 | 4·46 | 6·25 | 4·54 | 6·44 |
| 29 | 5·32 | 5·46 | 5·1 | 6·3 | 4·46 | 6·26 | 4·54 | 6·44 |
| 30 | 5·30 | 5·47 | 5·0 | 6·4 | 4·46 | 6·27 | 4·55 | 6·45 |
| 31 | ... | ... | 4·59 | 6·5 | ... | ... | 4·56 | 6·45 |

PHASES OF THE MOON.

| Date | | Phase | H. | M. | |
|---|---|---|---|---|---|
| 5 Sept. | ○ | Full Moon | 12 | 1 | a.m. |
| 13 ,, | ☽ | Last Quarter | 3 | 48 | ,, |
| 20 ,, | ● | New Moon | 7 | 33 | ,, |
| 26 ,, | ☾ | First Quarter | 10 | 3 | p.m. |
| 4 Oct. | ○ | Full Moon | 3 | 59 | p.m. |
| 12 ,, | ☽ | Last Quarter | 7 | 33 | ,, |
| 19 ,, | ● | New Moon | 4 | 33 | ,, |
| 26 ,, | ☾ | First Quarter | 8 | 44 | a.m. |
| 3 Nov. | ○ | Full Moon | 9 | 49 | a.m. |
| 11 ,, | ☽ | Last Quarter | 9 | 37 | ,, |
| 18 ,, | ● | New Moon | 2 | 2 | ,, |
| 24 ,, | ☾ | First Quarter | 11 | 39 | p.m. |
| 3 Dec. | ○ | Full Moon | 4 | 21 | a.m. |
| 10 ,, | ☽ | Last Quarter | 9 | 32 | p.m. |
| 17 ,, | ● | New Moon | 12 | 35 | ,, |
| 24 ,, | ☾ | First Quarter | 6 | 25 | ,, |

# Poultry.

## REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JULY, 1914.

Four thousand seven hundred and sixty-nine eggs were laid during the month. All the birds are now doing good work. The Black Orpingtons are doing especially well, showing what they can do when bred for egg production; this remark refers also to the S.L. Wyandottes. T. Fanning's Black Orpingtons win the monthly prize with 157 eggs. The following are the individual records:—

| Competitors. | Breed. | July. | Total. |
|---|---|---|---|
| T. Fanning | White Leghorns | 132 | 476 |
| Kelvin Poultry Farm | Do. | 133 | 442 |
| A. T. Coomber | Do. | 111 | 428 |
| Moritz Bros., S.A. | Do. | 142 | 368 |
| Loloma Poultry Farm, N.S.W. | Do. | 115 | 361 |
| Loloma Poultry Farm, N.S.W. | Rhode Island Reds | 126 | 359 |
| J. R. Wilson | White Leghorns | 136 | 348 |
| J. T. Coates | Black Orpingtons | 119 | 342 |
| R. Burns | Do. (No. 1) | 151 | 330 |
| G. Tomlinson | White Leghorns | 137 | 323 |
| Cowan Bros., N.S.W. | Do. | 112 | 312 |
| G. E. Austin | Do. | 101 | 308 |
| J. Gosley | Do. | 111 | 303 |
| R. Jobling, N.S.W. | Do. | 104 | 301 |
| J. D. Nicholson, N.S.W. | Do. | 119 | 301 |
| R. Burns | S. L. Wyandottes | 147 | 300 |
| Mrs. Bieber | Brown Leghorns | 92 | 297 |
| A. F. Camkin, N.S.W. | White Leghorns | 117 | 297 |
| J. Kilroe | Do. (No. 1) | 112 | 286 |
| E. Le Breton | Do. | 137 | 285 |
| R. Burns | Black Orpingtons (No. 2) | 139 | 285 |
| J. Manson | White Leghorns (No. 1) | 110 | 275 |
| E. V. Bennett, S.A. | Do. | 140 | 271 |
| J. T. Coates | Do. | 124 | 270 |
| J. Franklin | Do. | 126 | 267 |
| A. H. Padman, S.A. | Do. | 123 | 266 |
| Mrs. Munro | Do. | 116 | 263 |
| Marville Poultry Farm, Victoria | Do. | 102 | 259 |
| J. Kilroe | Do. (No. 2) | 107 | 258 |
| F. McCauley | Do. | 123 | 258 |
| Derrylin Poultry Farm | Do. | 120 | 258 |
| T. Fanning | Black Orpingtons | 157 | 249 |
| D. Morton, N.S.W. | White Leghorns | 121 | 248 |
| J. N. Waugh, N.S.W. | Do. | 78 | 240 |
| Mrs. W. D. Bradburn, N.S.W. | Do. | 111 | 237 |
| J. Zahl | Do. | 123 | 233 |
| Range Poultry Farm | Do. | 126 | 227 |
| C. M. Jones | Do. | 95 | 198 |
| F. M. Manson | Do. (No. 2) | 73 | 190 |
| J. Murchie | Brown Leghorns | 101 | 179 |
| Total | ... | 4,769 | 11,698 |

# The Orchard.

## THE PRODUCTION OF PAPAIN.

Although everyone is familiar with the common papaya (papaw) fruit, and most people are aware also of its digestive properties, many perhaps do not realise the commercial possibilities of the dried juice of the fruit, known as "papain," in the manufacture of medicinal preparations.

Papain is a white, tasteless, and odourless powder used in medicines. Individual samples, however, vary a great deal in appearance and properties. Some are almost inert, but this is probably due to faulty preparation, as the properly prepared article retains its properties well. Careful preparation is, therefore, important. The juice must in every case be collected from unripe fruits. As prolonged moisture is deleterious to the ferment, the juice should be dried as soon as possible, and, as heat will destroy its activity, it should be dried at a low temperature. The best method of preparing papain is to collect the juice of the unripe fruit, mix it with twice its own volume of rectified spirit, let the mixture stand for a few hours, and then filter off the insoluble matter and dry it at the ordinary temperature of the atmosphere.

There are no difficulties, it is stated, requiring great skill in collecting and preparing the juice for market, but care is necessary. Usually only the fruits are tapped. These abound in juice, particularly when the tree is young and during warm weather after rain. In the early morning the flow is most abundant. Very shallow incisions, not over one-eighth of an inch, are made about half an inch apart lengthwise of the nearly mature green fruits. The tapping may be repeated several times at intervals of three or four days. Only non-metallic instruments should be used in tapping or in collecting, for the juice acts upon metals and becomes discoloured. A bone or ivory blade may be used. The flow is free at first, and the liquid is caught in porcelain, glass, or earthenware vessels. Coagulation soon begins, and the mass must be scraped from the surface of the fruit. In most places where the industry is conducted labour is cheap, but it would seem that a more convenient and efficient vessel could be devised which could be quickly put in place to receive the juice, permitting the operator to proceed to the next tree.

The juice must be dried promptly after it is collected or decomposition begins. As the juice flows most freely in the early morning, it is usually collected then and dried wholly or in part during the remainder of the day. Sun-drying is followed to some extent; but artificial means, such as are furnished by a fruit-drier, are preferred. In Montserrat several driers have been made for the purpose and operated by the companies buying the juice from the peasants who gather it. One form of drier is about 3 ft. by 3 ft. and 6 ft. in length. The sides and ends are of brick, with an opening at one end for the flue and at the other end to admit fuel.

The top is open. About 1 ft. below the top a sheet of iron is placed, and upon this an inch or two of sand to modify and distribute the heat arising from the fire beneath. The coagulated juice is spread upon brown linen stretched upon frames which are made to fit the top of the drier. The drying must be effected with low temperatures, as great heat destroys the ferment. A temperature below 100 degrees Fahr. is preferred by some operators. The coagulated material may be placed upon sheets of glass while drying. When dry and flaky, it may be ground in a coffee mill, preferably while warm, and should then be in the form of a white or cream coloured powder, which should be placed in bottles and tightly closed.

In the powdered form or as dried flakes it is exported to America and Europe, where it is further refined and sold as a powder or in tablet or other form, under various trade names as "papoid," "caroid," "papian," "papayotin," &c.—"Indian Trade Journal."

[A simple method of preparing papain will be found in the June issue of the "Queensland Agricultural Journal," 1904. The price varies from 9s. to 15s. per lb. Ed. "Q.A.J."]

## PRUNING APPLE TREES.

"As the result of several years' experience," writes an American orchardist, "I venture to say that after the tree is once formed into the correct shape, summer pruning is the most economical for either young or bearing trees. On the young trees it promotes a solid, strong frame at an early age, and on the bearing tree it promotes fruitfulness. During the first three years all the energy of the young tree should be concentrated into building up a strong framework for the future. The most desirable tree for planting is a one-year-old on a two-year-old root, and in planting such a tree the top should be cut back to the point where the future head is to be formed, or at a height of about 18 ft. from the ground.

"As soon as growth starts, all the shoots that appear where they are not wanted must be rubbed off, leaving only three to five well-arranged branches that are to become leaders in the frame of the future tree. The object in rubbing off all the other shoots is to concentrate the growth into only those parts that are most desired. During mid-summer, when the growth is still in full vigour, and the leaders have reached a reasonable length, their tip ends should be pinched out, so as to start outside branches. Several of these will probably appear on each leader, but only two should be allowed to remain, all the others being rubbed off. This work is best done while the shoots are soft, as in that condition the trees do not suffer so much as when the shoots become quite woody and have to be cut.

"Branches should be removed while the trees are dormant, except when pruning is necessary to prevent the spread of troublesome diseases. When doing this pruning always bear in mind that you are trying to solve the problem: How can a solid, strong frame, of the most desirable

form, be most quickly attained? This kind of work takes brains as well as hands, as the work of shaping young trees is to endure for a lifetime. Stop the growth where it is not wanted, and fill out the parts where growth is needed. It is even necessary, in many cases, to put in one or two buds to get branches in the right position. Spread the young limbs where it is necessary, and even tie them into position. Lead the young trees as you lead a child.

"By doing this work every summer, and building up the tree, just as a bricklayer builds a wall by placing brick on top of brick, the growth of the trees can be regulated, and each season the tree will build up two solid stories instead of one. In such management there is no waste growth to look at in the late autumn, and no wood-butchering to do. Both the orchardist and the trees are ahead by following this rule, instead of leaving all the pruning to be done in winter."

## TOP WORKING ORANGE TREES.

By CHARLES ROSS, F.R.H.S., Instructor in Fruit Culture.

I have noticed in almost every orange grove of any considerable size in every part of the State, both amongst seedling and grafted trees, that there are individuals that have not come up to expectations as regards cropping, quality of fruit, and type.

Some are consistently poor croppers; others, although being exceedingly productive, the fruit is of indifferent quality, and others again bearing fruit that lacks uniformity of type, or the structural form of the tree is undesirable. Although there are sound reasons for such disappointments, it is not intended here to enumerate the causes leading up to such conditions. I propose giving some instructions how to bring such trees into a profitable condition in the shortest time.

Instead of reconstituting the tree by grafting low down the stumps, there are two methods of top working, over the second or third forks. One is by budding into the old stems, and the other is by grafting. Both methods may be adopted on the same tree.

If the bark is not too thick, the well-known shield method of budding with an inverted T incision may be performed, but in budding old stems I have found it rather difficult to raise the bark without cracking or breaking to allow of the insertion of the bud. To avoid bruising the bark, instead of making a straight incision, make a curved cut in the form of a crescent or half circle, and if the sap flow is active the bark is easily separated from the wood without injury. Angular budwood should be chosen for this method, not rounded, as would be necessary for shield budding. The bud is sliced off, leaving the bud to one side of the shield instead of the centre. The bark is then carefully lifted and the bud inserted, leaving the bud well out to one side of the curved incision. The bud should be tied with waxed cloth, rafia, or worsted.

Grafting is preferable to budding for old stems, except in some special cases. Professor Hume, in his work on Citrus Culture, recom-

mends the cleft graft for top working, and I have also found it the best method in this State.

The stock is cut off at right angles and the cut made perfectly smooth. Then it is split or cleft open by the knife, or grafting iron. Sometimes the cleavage is irregular, and to leave a straight surface for the scion the knife should be driven down in a straight direction. The cleft is held open by the knife or a wooden wedge. The scions should be from 4 to 6 in. in length, having not less than three or four buds. Trim the lower end of the scion in the shape of a wedge, about 1½ in. long, with the outside of the wedge a little thicker than the inner. Slip the wedge portion down the cleft, which should grip the whole of the cut surface. The thicker edges being outside, the cambium layers of both stock and scion are brought more intimately together. Two scions may be inserted if the stock is large, one at each side of the cleft. When the scion is in position the stock is firmly bound with strips of waxed cloth, and the upper surface of the stock, as well as the top of the scion (if cut), should also be waxed.

No further attention is required until the first signs of vegetative activity is evident, when the bandage should be severed. The growing shoot should be supported by a slat tied to the stock.

When a tree is denuded of all its foliage, the branches and stem should be thickly whitewashed to prevent sunburn.

## SULPHUR, LIME, AND SALT WASH.

This is an all-round winter wash for all kinds of deciduous fruit trees, and is an exceedingly effectual remedy for white scale, moss, and lichen growths, and the various bark fungi attacking the trunk and main branches of the citrus trees, but is too strong to apply to the foliage unless much diluted. It is both a fungicide and insecticide. It is made as follows:—

Take 40 lb. of unslacked lime, 20 lb. of sulphur, 15 lb. of salt, and 50 gallons of water. To mix, take 10 lb. of lime, 20 lb. of sulphur, and 20 gallons of water; boil for not less than one hour and a-half, or until the sulphur is thoroughly dissolved, in a strong iron (not a thin copper) boiler, when the mixture will be of a brownish colour. Slack 30 lb. of lime in a barrel with hot water, and when thoroughly slacked, but still boiling, add the 15 lb. of salt; when this is dissolved, the whole should be added to the lime and sulphur in the boiler, and the whole boiled for half an hour longer, when water, to make the whole up to 50 gallons, should be added. Strain through a wire sieve, and keep well stirred whilst in use.

As this mixture is very hard on the hands, use gloves when spraying, and have good bamboo extensions fitted to the hose attached to the spray pump. It is also hard on the pump and nozzles, so see that the pump is kept clean, and is never put away without being rinsed out with very hot water. In making this mixture the salt can be omitted if so desired.—"The Agricultural Gazette of Tasmania."

# Apiculture.

## WARNING TO BEEKEEPERS.

"Bees are dying in thousands in Wiltshire," says the "Daily Telegraph," and the honey harvest promises to be very disappointing. It is interesting to hear the opinions prevailing in the countryside as to the cause of the disease. Many beekeepers declare that the heavy death-rate now is due to the recent spraying of fruit trees with chemical washes, and the trouble is likely to be augmented later when potatoes are sprayed. Hives one day are full of industry, and the next there are dead bees lying about in thousands on the hive floor. A curious point about the disease is that the bee returns to the hive to die. Motor cars with gaseous fumes are suggested as another cause of the bee scourge."

Since this paragraph appeared, we have received a letter from Mr. Arthur N. J. Hill, Toorbul, to the following effect:—

"In your Journal for March and April you give directions for poisoning trees with arsenical solution, but there is one thing I should like to see mentioned in connection with it; that is, a warning in regard to bees, for there is a great danger if the arsenic is applied when the trees are in flower, if the timber treated is anywhere near where there are apiaries. I am sure that a warning is surely needed in that regard when the arsenic process is advised. Would not the solution work as well at any other time than when the trees are in flower? Although no special time is mentioned, there is always the danger of the trees, perhaps, being treated then. The danger of poisoned honey is a very serious one; for, supposing that during a honey flow there were only one or two frames needed to be drawn out a little more to fit the supers for extracting, and a person somewhere within the range of an apiary was to poison an area of timber that was *flowering,* the bees would, during a good flow, fill those few frames from part of the poisoned honey, and, before, perhaps, any effect on the bees were shown, the honey would be extracted and shipped off to a firm, and would be packed directly they received it in retail packages and sold to the public with very serious results. Although no reports are heard of such and no cases have happened here, there is always the danger of it happening if the trees are treated when flowering. It would be very greatly appreciated if a warning were put in the Journal. There is no doubt that the method is a very good one for destroying trees, but, in the interests of all concerned, it should be made known the terrible effect the honey from the poisoned flowers would have. In America the bees are protected from being poisoned through spraying fruit trees when in bloom. Of course, if trees were treated when not in bloom there would be no ill-effect; and if, when the arsenic method were advised, this fact were pointed out, all trouble would be avoided."

# Tropical Industries.

## THE SEX OF DATE PALM SEEDLINGS.

In the issue of this Journal for March, 1903, we published a short notice, translated from the "Journal d'Agriculture Tropicale," in which it was stated that it is possible to change the sex of the date palm.

The inhabitants of the southern oases in Algeria (says that journal) maintain that it can readily be done. Of 100 date palms, 80 are male trees; hence it may readily be conceived that it is greatly to man's interest that the cultivator's intervention should be crowned with success. The method consists of tearing off all the leaves from the footstalks at two or three years of age, so that the medial nerve is split in two from the centre to the leaf sheaf. The idea of the Arabs is that this tearing process brings on a concentration of the sap movement in the same way as in the case of an annular incision, and results in an accumulation of sap, which is more necessary for the vital functions of the female plant than for those of the male. No objection, says the editor, from a vegetable pathological point of view, can be raised against the above assertion, for the reason that in young plants the organs are not yet different from each other.

In a Bulletin (No. 4, 1914) issued from the Royal Botanic Gardens, Kew. we find the folowing interesting article on this subject:—

Attention has recently been drawn to a belief held by the Arabs that it is possible by artificial means to change the sex of seedling date palms and to convert male into female trees.

Reference to this belief will be found in Popenoe's recently-published book on the Date Palm,* and a note was also printed in the Gardeners' Chronicle† early in the year in connection with an article which appeared in the Tropical Agriculturist‡ of Ceylon on the subject.

The story in which interest has again been aroused is, however, no new one, for it was first brought to the notice of European readers as long ago as the year 1901, when Professor Schweinfurth published an article on " The Cultivation of the Date Palm " in Gartenflora.§ From this original source the account of the supposed change of sex has been somewhat widely, if sporadically propagated.

It reappeared in "Le Jardin" of 20th June, 1902 (p. 177), without any acknowledgment of its source, and thence it has been copied into numerous agricultural journals, &c., becoming considerably modified in the course of years.

It will be seen from information kindly supplied to Kew by Mr. G. St. C. Feilden, Chief Gardener to the City of Cairo, that the Arabs

* Date-Growing in the Old and and New Worlds. Paul B. Popenœ, p. 123.
† Gard. Chron. Dec., 1913, lv. p. 57.
‡ Trop. Agric. Dec., 1913, xli. p. 482.
§ Gartenflora, 1901, l. pp. 545-6.

believe that the sex of young date palms may be changed under certain conditions; but that these beliefs rest on any adequate basis of fact seems to be highly improbable.

It is alleged, however, that it is possible to tell the sex of seedling date palms before the young plants have flowered, and the information given may be of use to those who contemplate making a date plantation from seed.

Whether there be any truth underlying these Arab beliefs in the possibility of turning male date palms into female or not is really only a matter of minor importance from the economic point of view, since, as Professor Schweinfurth points out in a letter sent to Mr. Feilden, the date palm is propagated almost entirely by the offshoots formed at the base of the palm; for not only is there an uncertainty as to whether a date palm seed will yield a male or a female tree, but there is also the further difficulty that the seedlings only rarely resemble their parents, and it is very unlikely that a good variety will come true from seed.

In order to try and ascertain whether the Arab belief in the change of sex of the date palm might rest on any foundation, letters of inquiry were sent to Professor Trabut at Algiers and to Mr. Feilden. From Mr. Feilden several interesting particulars were obtained in the form of answers to specific questions which he put to three prominent native growers of dates in Egypt.

He also pointed out that the belief in the change of the sex of date palms does not appear to have been an ancient one, since Delile, writing on Egypt in 1824, mentions that the reason why palms were not usually grown from seed was because of the uncertainty of knowing whether the seedlings would be male or female, and that for this reason propagation by offshoots was the recognised method of raising a stock of young palms.

The following questions were put to the native growers:—

1. What percentage of seedling date palms are male?

*Answers:* A. 66 per cent. male.
B. 33 per cent. male.
C. 33 per cent. male.

2. Is there any way by which the sex of a young date palm can be determined?

*Answers:* A. The leaflets, especially the lower ones, are stiffer in the males than in the females.

B. The seedlings are covered with a light straw mat; the male seedling pushes its way through or raises the mat. The females bend sideways being weaker. In larger plants same answer as No. 1. Of seedlings planted at same time, the male grows far more quickly than the female.

C. The same answer as A.

3. Is there any way by which the young plants can be made females?

*Answers:* A. If the seedlings are transplanted at two years old the number of females is at least doubled.

B. Knows of no way.

C. The roots have tubercles on them. If these tubercles are removed the plant becomes female.

C. also says that if seed from dates which have been eaten is sown, the seed presumably being scraped by the teeth, more males result; if the date seed is sown uninjured the females predominate.

4. Have you ever heard of any method of tearing the leaves of the young palms to induce females?

All three growers say they have heard of no such method.

From Professor Trabut we received the following letter* on the subject:—

" The legend of the transformation of the date palm from males to females is an Arab legend, and is given publicity to by M. Le Comte de Follney, landowner at Biskra. I believe that no confirmative experiment has been made. The Arabs operate on seeds of which they do not as yet know the sex. This practice has never been employed continuously. Hence there are never more than 50 per cent. of males produced from the seed. To settle the question, it would be necessary to take 100 seedling palms and split the leaves of all of them to ascertain if, by so doing, they would become females.

"There has never been any idea of operating on the ' offshoots,' but only on the young seedlings which have not yet borne flowering organs. The operation consists in splitting the leaf, following the rachis, which is split down the centre.

"For further information, you might write to M. de Follney, at Biskra, who would be pleased to give you a detailed reply.

" (Signed) L. TRABUT."

Acting on Professor Trabut's advice, a letter was written to the Count de Follney in the following terms* on 14th February last, but unfortunately no reply has as yet been received, and the supposed change of sex of date palms can only be regarded as a supposition believed in by the Arabs:—

"Royal Botanic Gardens, Kew,

"M. le Comte, "14th February, 1914.

"I learn through Professor Trabut, of Algeria, that you are interested in the problem of the transformation of the male date palm into the female tree, and, as this problem is of high scientific interest, I trust that you will kindly give me some information on the subject. Since the year 1901 Professor Schweinfurth has given an account of the method practised by the Arabs to obtain this result, and which consists in splitting the leaves of the young date plants.

" As the details given by him on the subject of this manipulation were furnished to him by you, I would ask if the experiment has been made by you or by others in a systematic manner which would give value to this belief of the Arabs in the transformation of sex in the date palm.

* The letters being in French, we have translated them for the information of our readers.—Ed. "Q.A.J."

"Seeing that apparently the operation is performed on young seedlings, the sex of which it is as yet impossible to recognise, it appears that the only way to prove the truth of the hypothesis would be to plant two seed beds with at least 100 date seeds in each. Then the seedlings in one of these plots should be allowed to develop normally, a note being taken of the proportionate resulting males and females; whilst the leaves of all the others should be split according to the method described, and, if all the plants in this bed proved to belong to the female sex, a sufficient proof would then be afforded of the efficacy of the Arab method.

"Possibly an experiment of this nature has already been made by you, in which case I trust you will have the goodness to give me as many details as possible of the results obtained. If, on the other hand, the Arab belief is still in the realm of legend, I hope that it may be possible for someone interested in the cultivation and propagation of the date palm to carry out some experiment similar to that suggested by me. With apologies for troubling you with this matter,

"(Signed) D. PRAIN, Director."

## COTTON IN THE WEST.

In the June issue of the Journal, we gave the views of Mr. E. E. Wood, an American cotton-grower, on Queensland as a cotton-producing country. Mr. Wood, at the time, showed us some fine samples of Upland cotton which he said he had picked at the State school garden at Capella, and also at a farm at Dulacca. Subsequently we were informed by Mr. Just that the cotton came from his son's farm near Miles, as stated in the July issue of the Journal. We are now informed by Mr. A. D. Whitecross, of "Ripera," Dulacca, that the cotton referred to in June was picked by Mr. Wood at Fulham Park, Moraby Creek, South Dulacca, and was grown by Messrs. Simpson Bros. As Mr. Wood picked cotton in several places on the Western line, it is possible he might have got mixed up in the names of growers and localities. We cannot enter into a controversy on this matter, which is, however, of importance as indicating a healthy rivalry amongst the advocates of cotton-growing in the West, which may, we hope, lead to the extension of the cotton industry not only in the West but on the Eastern coast as well.

## TWO GOSLINGS FROM ONE EGG.

Two goslings (says the "Live Stock Journal") have just been hatched from a single egg on one of the farms of Messrs. Chivers and Sons at Histon, Cambridgeshire. Such an event is almost unprecedented, the birds from double-yolked eggs usually being deformed, if they hatch out at all, which is rarely the case. These twins are well shaped and healthily developed, and there is every indication that they are going to grow into fine, vigorous birds. The egg that produced the twin birds was hatched out by a hen, who is devoted to her foster-children.

# Plant Pathology.

## DISEASES OF THE POTATO: REMEDIES AND TREATMENT.

In addition to precautionary measures against the attacks of Injurious Insects and Disease on Seed and Harvested Potatoes dwelt upon by the Government Entomologist and Plant Pathologist (Mr. Henry Tryon) in his paper thereon, published in the Department's pamphlet "Potato Cultivation in Queensland," he further on gives directions for the remedies and treatment for the diseases of the growing plant as follow:—

### A.—SOIL TREATMENT.

#### CUT WORMS.

[Dark-coloured, dull, naked caterpillar grubs, upwards of 1 in. in length, the young of *Agrotis subnigra*, and probably of other species of night-flying moths, living in the soil during the day and feeding principally at night.]

*Remedies.*—Poisoned Baits (*vid.* p. 28).

NOTE.—It usually happens that these marauders are already in the soil when the land is being prepared for cropping, and may be then both detected and dealt with. In this case the use of the Poisoned Baits, although then most serviceable, especially should the land be well cleaned prior to their employment, may give way to that of the "Travelling Fowl Yard"; poultry being great enemies of cut worms, and soon following all horse implements when seeking them.

#### ROOT GAUGERS.

[Stout-bodied, oval, glossy-brown beetles, measuring about ¾-inch in length, belonging to the scarabæid genus *Isodon* and species *puncticolle*, and another, that—both in their grub and adult phases—gnaw the tubers, the roots, and the stem bases of the potato plant.] Usually these are present in the soil when the potato is planted. A successful means for coping with them has yet to be devised. The use of Bisulphide of Carbon as a direct insecticide and of "Vaporite Strawson" as a deterrent have been recommended. Fortunately the insects, though very destructive, only exceptionally affect the potato cultivation, or, if generally harmful, only so in few and definite localities.

### B.—SEED TREATMENT.

(1) ***Brown Rot or Bacteriosis;*** (2) ***Dry Rot or Fusisporium;*** (3) ***Black Shank or Rhizoctonia;*** (4) ***Black Wart;*** (5) ***Nematode Disease or Root Gall;*** (6) ***Scab.***

The prevention of these diseases is to be accomplished—(1) by excluding potatoes affected by them when buying, selecting, handling, cutting, or planting the "seed"; (2) by refraining from using, for

successive crops, land that has yielded a stand of potatoes affected by any one of them, or (3) has received a compost composed in part of potatoes or potato plants that have succumbed to their attacks.

As potatoes harbouring these diseases may, when but slightly affected, escape detection during the procedures referred to, and insomuch as—in the case of some of them—sound potatoes may become infected by contact with diseased ones, the "seed" should be always disinfected as an additional precaution, since such treatment will in great measure eliminate scab disease arising otherwise under this circumstance, and may also lessen, although it cannot be counted on to prevent, the subsequent manifestation of the other maladies mentioned.

Although the occurrence of Potato Blight (*Phytophthora infestans*) may, under some circumstances, be prevented by these actions, additional precautions are necessary that concern the treatment of the growing plant. These, however, *must by no means be regarded as rendering these procedures uncalled for or unnecessary.*

## C.—PLANT TREATMENT.

(1) Potato Blight (*Phytophthora infestans*); (2) "Black Spot," "Leaf Spot," or "Early Blight"; (3) Lady Bird Beetles (*Epilachna 48-punctata* and *E. guttato-pustulata*); (4) Flea Beetle (*Haltica* (*Arsipoda*) *solani*); (5) Green Caterpillar (*Plusia argentifera*); (6) Split Worm or Leaf Miner (*Gelechia* (*Lita*) *solanella*).

In order to prevent the occurrence of Potato Blight, and to stay its extension in the field; to obviate the attacks of the insects mentioned; and to kill them, and so check their injuries when these attacks are proceeding *it is necessary to spray the growing plants—in fact, the motto of the potato-grower should be "Spray—Spray—Spray"*—three applications at intervals being necessary.

The Spray Fluid applied should be preferably Bordeaux Mixture, to which an Arsenical Compound (Arsenate of Lime, Arsenate of Lead, or Paris Green) has been added, and made according to the directions given later.

In order that this spraying may be effective, the material sprayed must entirely cover the foliage—with a thin film or almost contiguous dots—and remain adherent thereto; and, that this may be so, the spraying must be renewed as often as fresh foliage is produced or the material applied has been removed by rain. The purpose of the application is to prevent the various fungus spores (in myriads though they be) from sprouting; or, should they sprout, to secure that the foliage—at every point—is so poisoned that these sprouts may be killed or prevented from penetrating therein; also, that it will be so generally prevalent on the plant as to reach every leaf-eating insect present thereon or immediately threatening it; rendering, in fact, the foliage either distasteful or deleterious to it. To secure this, the *spraying must be commenced at an early period in the growth of the potato plant,* when, say, it has attained a height of 6 in. or even less; and *it must be repeated at least twice during the growing season* or as often as circumstances, above alluded to, demand.

For the application to be thorough and at the same time made with due economy of material and labour, *it must be applied in a mist-like form* and not necessarily allowed to run down or drip on to the ground.

To secure this, it must be applied with *force* through a Vermorel or Bordeaux atomising nozzle, and by aid of a more or less powerful spray pump. Force again is needed for the spray to be made to reach the under surface of the foliage, although—contrary to what is ordinarily stated—infection commonly takes place through the upper leaf surface.

Where patches alone of potatoes are being grown, an ordinary Bucket Spray Pump will meet all requirements. When, again, areas up to 4 or 5 acres have to be dealt with, a Knap Sack Spray Pump will need be available.

With larger areas, or when operators are available to contract for spraying several farmers' plots of even small dimensions each, other pumps of larger capacity and force may be more economically employed, attached to vehicles drawn through the fields by horse power, and having each several delivery tubes and nozzles, the pumping as well as the control of these being effected by ordinary labour, or the motive power to work the pump being derived from the wheels by special gearing, and the nozzles adjusted to the height and distance apart of the rows of potato plants.

*The Bordeaux Mixture (and the same remark applies to the Soda Bordeaux), if properly made, is not injurious to the potato plant in any way.* Not only so, it is claimed for it that *it improves the tuber itself*, endowing it with a larger amount of starch than is possessed by unsprayed potatoes, even when those are not visited by *Phytophthora infestans.* Thus it has been asserted of its application that the cost of this is met by the improvement of the crop.

## D.—THE "REMEDIES."

### (A.) BORDEAUX MIXTURE—WITH INSECTICIDE.

In the preparation of this, the following materials and utensils are needed:—

1. *Wooden Casks* of good quality, two of 40 gallons each, one of which has been cut across so as to make two strong tubs of 20-gallon capacity, and the other has had its head removed and top hoops replaced in position.
2. Kerosene Tins to serve for boiling water; with or without the addition of wooden pails for pouring a metal corroding fluid.
3. Water, an accessible supply—preferably already contained in a tank.
4. Materials for making an extemporised fireplace and fire in the open.
5. Lime, Quick Lime, or ordinary Kiln Slacked Lime if it be quite fresh (say, 16 lb. for every acre for each spraying); Bluestone, or Copper Sulphate, of good quality (say, 12 lb. for every acre for each spraying).

6. Paris Green, say 1 lb. for every acre for each spraying; or Arsenate of Lead, 2 lb. for each spraying; or Arsenite of Lime.
7. Yellow Prussiate of Potash (Ferrocyanide of Potassium—about 1 oz. dissolved in ½-pint bottleful of water).
8. Some bagging to place over the mouth of a cask for straining purposes, or preferably a strainer made with a square wooden frame, and this fabric or brass gauze to serve the same purpose.
9. A Weighing Appliance (Spring Balance).

In making the combined Fungicide and Insecticide, proceed as follows:—

To make 40 gallons at a time, measure—

Sulphate of Copper (Bluestone), 4 lb.
Fresh Lime, 4 lb. or more.
Water, 40 gallons.

Then, having partly filled one of the tubs with boiling water, suspend the Bluestone tied in a piece of some open fabric from a stick placed across its rim, leaving it till it has dissolved, and then fill up the tub with additional warm or cold water.

In the other tub (or in a wooden pail) place the lime and add hot water in small quantity at first—say, 1 quart or 1½ quart. When the lime begins to crack and crumble and the water to disappear, add another quart or more, being prompt with the supply so that the lime at no time gets too dry. Then add carefully and slowly, more and more water—with stirring—until a perfectly smooth paste is obtained. Then, if not already in the second tub, pour it therein and add water—with stirring—till it be equally full as the other. Now pour these *together* pailfulls at a time with straining—into the 40-gallon open cask, stirring the mixture meanwhile for two or three minutes.

[NOTE.—Any less quantity than 40 gallons of Bordeaux Mixture may be made, of course; the proportions 4-40-4 being observed.]

Four pounds of lime, or a little more than this, is usually sufficient to neutralise the copper sulphate solution. It is, however, well to be prepared with a little additional lime water, since the quality of different limes vary considerably, some containing more or less clay or carbonate, both of which tend to weaken their action in the mixture. Accordingly, when the Bordeaux Mixture has been made as above described, it need be tested in order to ascertain if it is "correct"; for, otherwise, it may damage foliage to which it is applied. The tests available are as follows:—(1) After the mixture has been well stirred, a bright steel knife blade is held in it for at least a minute—"if metallic copper forms on the blade, or, in other words, if the polished surface of the steel assumes the colour of copper-plate, the mixture is unsafe, and more lime water must be added, until this phenomenon is no longer produced"; or (2) if, after stirring well and a drop of the Ferrocyanide of Potassium be added, a red coloration appear where the drop fall, similarly there is indication that more lime is required to be added until the drop is

diffused in the liquid without discoloration. This last test is preferably made in a china cup or saucer.

[NOTE.—The ferrocyanide solution produces a deep-blue precipitate if iron sulphate be present, and this is often an adulterant of Bluestone.]

The Bordeaux Mixture is the better the more freshly prepared it is, and mere standing causes a settlement in it; and in any case it should not be kept in any metal vessel other than a copper or copper-lined one, since it has a corrosive action on metals generally.

However, both the Bluestone Solution and the Lime Water may be kept for a long time unmixed without deterioration. This fact enables concentrated stock solutions to be prepared from which the Bordeaux Mixture may be compounded with great readiness. To make these stock solutions, dissolve 40 lb. of copper sulphate in 40 gallons of water. In another barrel slake 50 lb. of good stone lime, and add enough water for 40 gallons of milk of lime in it. Keep these barrels tightly covered to prevent evaporation. When it is desired to make a barrel of Bordeaux Mixture, stir the stock solutions thoroughly, and dip 4 gallons from each barrel and place in separate tubs, and dilute to 20 gallons and mix as before. Of course any smaller volume of the solutions of 1 lb. per gallon may be employed as stocks. During the later sprayings, when the foliage of the potato is less delicate, the Bordeaux Mixture may be used of greater strength—say of 6-40-4 strength—a formula implying the use of 6 lb. of Bluestone, 40 gallons of water, and 4 lb. of lime.

If good fresh lime cannot be got, use 5 lb. of washing soda instead of 4 lb. of lime; this—as already stated by the writer—makes what is styled Bordeaux or Burgundy Mixture. It—it may be remarked—loses its power of adherence in 24 to 48 hours after it has been made, especially should the temperature be high at the time. It should, therefore, never be used unless freshly prepared.

In cases where the trouble involved in the ordinary preparation of Bordeaux Mixture may forbid its use, the potato-grower may avail himself of the "Bordeaux Paste," that, made according to the directions of Professor S. Pickering for the Duke of Bedford's Woburn Fruit Farm, and that "reproduces—when added to water—a mixture absolutely identical with the commoner fungicide," is now on the market.

*The addition of the Insecticide.—Before using the Bordeaux Mixture, it should, however, receive, with thorough stirring, an addition of an Arsenical compound*—Arsenate of Lead, 1 lb.; or Paris Green, ¼ lb. —for every 40 gallons. In each case it will be convenient to treat these before adding them; the Arsenate of Lead being broken down with water to form a milk-like fluid, and the Paris Green being made into a paste as in the preparation of ordinary paint. This work should be done under cover; and it should be borne in mind that both are virulent poisons; and, when not immediately intended for use, must be kept under lock and key and conspicuously labelled.

*The Apparent Absence of Disease not to Excuse the Obligation to Spray.*—With regard to the application of Bordeaux Mixture (whether combined with an Insecticide or not) to the potato plant, it is necessary

to point out that it should be made without reference to the absence of the Potato Blight or other diseases. "Notwithstanding [as the writer has already stated] the disease may not appear, or, if so, be little prevalent, during any particular season, still this *spraying is persisted in as a protective measure against its visitation* (as a kind of insurance policy), it not being possible to foretell whether it will put in any appearance or not; and, when procedure is delayed until the earliest symptoms of its presence are revealed, so rapidly may it be propagated that the time for dealing with it will have already gone by in most cases, for the treatment has little or no influence on infection that has already taken place." Its actual presence—for the time being in great measure latent or hidden—is always more general than the earliest symptoms of this indicate, existing, in fact, even when they are as yet unnoticeable.

## E.—HAND PICKING.

INSECTS HAND PICKING.—Although the attacks of Lady Birds, and to a less extent those of the Split Worms, may be met by the administration of combined Bordeaux Mixture *cum* Insecticide, and this will in great measure deter Flea Beetles from their destructive onslaught, timely dealing with the Insects by hand-picking is, whilst not a costly operation, a very efficacious one. It is the insects that occur early in the season in twos or threes on the young plants, and so may be easily picked off, that commonly form the hordes that later on may skeletonise the entire foliage or otherwise destroy it later on. So also the first attacks of Split Worm—brown translucent patches on the foliage—may be early discerned, and they and their producers cut out and destroyed. The very rapid rate at which both insects multiply may otherwise account for very serious injury to the growing plants.

## F.—ATTENTION TO WEEDS, ETC.

It must not be forgotten that several weeds that belong to the Potato Tribe (Solanaceæ) harbour the insects of the same kinds as those that attack our esteemed vegetable. Attention, therefore, should be given to this fact and to them, with a view to their prompt extermination. The Black Nightshade (*Solanum nigrum*) has especial claims on the farmers' attention in this regard.

## G.—TOMATO, ETC., AND POTATO.

What has been stated as regards weeds applies, too, to the Tomato and to a less extent the Egg Plant. Where these are grown near the potato-plot, they should receive similar treatment to it. This has especial reference to the fact that Tomato and Potato alike suffer from "Blight."

## H.—POISONED BAIT.—CUT WORMS.

The efficacy of this is dependent on clean cultivation; poisoned baits being not likely to succeed, if the ground supports a crop of weeds or herbage generally; also, on the fact that the cut worms are generally in the soil already when the "seed" is put in and so available to mow down

the young potato plants that result from its growth. It follows from this also that, if after breaking up the land preparatory to planting, it be well worked and kept quite free of weeds for some days prior to the crop being put in, not only will a better crop be secured in the absence of disease, but damage from cut worms will be largely avoided without the use of any "baits" at all.

The materials required for these are:—Any green stuff ordinarily fed to stock or leaves of cabbage, potato, tomato, or succulent non-acrid weed cut into small bits half an inch long; (2) Arsenite of Soda; (3) Molasses or Ration Sugar; and (4) Water.

In combining these to form baits, the Arsenite, Molasses (or Sugar), and Water, in the proportions of 1 lb., 8 lb., and 100 lb. (10 gallons), are mixed in a special receptacle to form a poison fluid, and with this the chopped succulent material is well moistened by aid of a syringe or whisp, being turned over during the process. [NOTE.—It is not desirable to drench it.] This bait thus prepared, and placed in a bag or other receptacle, is broadcasted over the land, before planting, if cut worms have been found to be present. Should, however, their discovery have been made later, it should be sown between the rows, so as not to come in contact with the growing plants.

As the cut worms feed during the hours of darkness, or principally so, this "bait" should be placed in position at about sundown, or shortly before, so that it can be partaken of by the marauders when about, and whilst still succulent; but the application of the sweetened water is not only to maintain the "bait" moist, but to mask the taste of the poison with something to which cut worms generally are especially partial. Of course, this bait should be kept out of the reach of stock and not so distributed as to leave masses that animals can pick up, nor be placed on land that is immediately run and fed over by poultry.

## INGREDIENTS—INSECTICIDES AND FUNGICIDES.

The materials to be used as insecticides, germicides, &c., are stocked by the following Brisbane wholesale houses—*i.e.*, Messrs. Taylor and Colledge, Messrs. Elliott Brothers, Messrs. Chater and Company, and W. H. Barnes and Co.; and are obtainable there at the undermentioned prices:—

*Sulphate of Copper* (Bluestone)—32s. per cwt.

*Lime*—3d. per lb. (*vid.* firms dealing in building materials).

*Paris Green* (Blundell and Spence's)—1s. 6d. per lb.

*Arsenate of Lead**—1s. 9d. per lb.

*Formalin* (40 per cent.)—2s. per pint; 14s. per gallon.

*Corrosive Sublimate*—4s. 6d. per lb.

*Woburn Bordeaux Paste*—8d. per lb. (W. H. Barnes and Co.)

*Ferrocyanide of Potassium*—1s. 6d. per lb. [Quotations, 14th August, 1911.]

* *Vid. Brünnich* (J.C.) and *Smith* (F.), "Commercial Arsenate of Lead": "Queensland Agricultural Journal," Vol. XXVI., 6 pp. (333-336), June, 1911.

## SPRAY PUMPS.

Spray Pumps are obtainable from the undermentioned Brisbane firms:—Messrs. Smellie and Company, Edward street; from Messrs. Perry Brothers, Queen street; from B. G. Wilson and Company, Queen street; and from McLennan and Company, Albert street. They should be made of copper, or copper-lined; and the valves—liable when of rubber to perish—should be metal ones (brass). If of rubber, however, several spare valves should be supplied—a remark that applies to other parts when made of this material. The first-named firm stock a knapsack spray pump, named the "Gould," that costs 75s. Messrs. Perry Brothers, and also Messrs. B. G. Wilson, on their part, stock the well-known knapsack spray pump, the "Figaro." This, however, does not possess the metal valves of the former, although it does very satisfactory work. It costs 50s. Messrs. McLennan and Company supply the well-known New Zealand Billen's "Perfect Knapsack Potato Spray Pump." The price of this is 70s. [Quotations, 14th August, 1911.]

"Hand Potato Sprayers" with several delivery tubes, and moved by horse power, are stocked by Messrs. Smellie and Company, Brisbane; Messrs. Edwards and McGinness, Melbourne; and Messrs. Langwill Brothers and Davies, Melbourne. The last-mentioned firm is agent for a "5-row Automatic Potato Sprayer," the "Fleming."

## THE EFFECT OF SUGAR-CANE CROPS ON OTHER CROPS.

Some interesting experiments have recently been conducted in Java on the effect of sugar-cane crops on other crops grown on the same soil. Thirty-two plots were laid out in the same series—one series being planted with sugar-cane, and the other with earth-nuts. The next year the whole of the plots were planted with maize. The result was that on the plots which had been planted with sugar-cane the yield of maize was about 81 lb., while on the series which had been planted with ground-nuts the yield was only 54 lb.

The next year the whole was planted with rice, the results being again in favour of the plots which had been planted in the first instance with sugar-cane. It would appear from these experiments that the sugar-cane takes less out of the soil than ground-nuts. The constant growing of cane on the same soil without rotation is in itself evidence of the very small call which the sugar-cane makes upon the soil. In some cane lands there have been uninterrupted crops for scores of years.—"Wealth of India."

# Animal Pathology.

## TAPEWORMS IN SHEEP AND LAMBS.

By A. H. CORY, M.R.C.V.S., Government Veterinary Surgeon.

SYMPTOMS.—Eight varieties of tape worms are known to infest the bowels of sheep. Lambs will not fatten when harbouring these worms; they become unthrifty, hidebound, and the wool is hard and poor in quality. The animals appear stiff when moving, and generally hang behind the flock when being driven.

Tapeworms produce emaciation with paleness of the mucous membrane of eyes, nose, mouth, &c. The function of the digestive organs is impaired, the food being chewed irregularly, breath unpleasant, occasional colic, tympany of abdomen, diarrhœa with mucous in which is frequently found segments of the tape worms. The sheep ultimately die from poverty and exhaustion.

PREVENTION.—Prevention consists in draining damp land, stagnant water holes, &c., and by keeping uninfested sheep from known infested pastures. Infested pastures should, where practicable, be ploughed or dressed with salt, lime, or sulphate of iron, allowing about ½ cwt. per acre. Avoid overstocking.

TREATMENT.—For treatment of six-months-old lambs. Fast animals for eight or twelve hours, and give the following:—

| | |
|---|---|
| Oil of turpentine .. .. .. | 1 drachm. |
| Powdered areca nut .. .. | 25 grains. |
| Extract of male fern .. .. | 15 drops |
| Linseed oil .. .. .. | 1 oz. |

Repeat the dose once weekly for three weeks. Repeat the dose according to age of animal.

Where it is not practicable to drench sheep, 25 to 60 grains of areca nut (according to size of animal) should be given to each sheep, on two or three occasions, mixed in some bran or other food.

## WHITE SCOUR IN CALVES.

By A. H. CORY, M.R.C.V.S., Government Veterinary Surgeon.

The following treatment is recommended for White Scour in calves:—

Thorough cleanliness of calf pens, yards, feeding buckets, &c ; good clean milk given regularly, and in proper quantities (the quantity should

be reduced somewhat until the bowels are normal). Isolate sick calves. Give two or three times daily, as a drench, in a little water or milk:—

5 to 10 drops pure carbolic acid.
1 drachm glycerine.
1 oz. tincture of ginger.

Blood Scour is very fatal, and seldom amenable to treatment. In this case the cows are probably the cause, being frequently affected with contagious abortion, so that investigation should be made in this direction. Even when calves recover from this complaint, they seldom are of any profit to the owner, remaining unthrifty and puny.

Here, again, thorough cleanliness and isolation are essential. Limewash with carbolic acid should be freely used where practicable to walls, fences, &c., around sick animals.

As remarked above, treatment is of little service; but the medicine described for White Scour will answer the purpose, the chief part of it being the antiseptic—viz., carbolic acid

## PARALYSIS IN PIGS.

BY A. H. CORY, M.R.C.V.S., Government Veterinary Surgeon.

Paralysis in pigs is brought about by several causes—viz., rheumatism, worms in the kidneys and surrounding parts, and by overfeeding young pigs on an exclusive diet of corn and water.

TREATMENT.—If due to rheumatism, see that the pigs are housed at night in a dry place and allowed to sleep on wood flooring instead of on concrete or earth. Give, daily, salicylate of soda 15 to 30 gr., and bicarbonate of potash 1 to 2 drachms, in the food or as a drench.

If due to worms, I would recommend giving in the food or as drench:—One teaspoonful of oil of turpentine; liquid perchloride of iron, 20 drops; and raw linseed oil, 3 or 4 oz. This is sufficient for 50 lb. body weight. It should be given after the animal has been fasting for some hours, and can be repeated several times with an interval of three or four days.

When due to feeding, as mentioned above, stop the corn, and give once daily in a mixed diet or in milk 1 dessertspoonful of the following power for every 100 lb. body weight, after it has been well mixed and powdered:—Sulphur, 2 oz.; sodium bicarbonate, 4 oz.; sodium sulphate, 2 oz.; black antimony, 2 oz.; sulphate of iron, 1 oz.; wood charcoal, 2 oz.

## SEED CONTROL.

Austria has an elaborate system of seed control, under which the purchaser may send samples to the institution for examination and testing, and may obtain compensation from the vendor when the seed is not up to a required standard. This compensation is fixed on the basis of the guaranteed practical value as compared with the value of the goods as delivered.

# General Notes.

## LOUSY SHEEP.

The Chief Inspector of Stock in South Australia, who is doing his utmost to eradicate the lice pest, says that infested Merinos neglected for a few months lose practically all the wool on their sides, as a result of biting and rubbing to relieve the constant irritation caused by the bites of the parasites.

He pertinently points out that the lice are not bred by poverty, as many fallaciously assert. There are males and females, and the life cycle is completed as the result of the latter depositing her fertile eggs in the yolk about the roots of the wool, where they soon hatch out, and increase the sufferings of their unfortunate hosts by sucking blood, and in their turn becoming breeders. The louse, which is a greyish pink, is about the thirtieth of an inch in length, and lies close to the skin. The annual loss to the national wealth through the presence of this destructive parasite has been immense; far greater, in fact, than that caused by the sheep tick—an intimate associate which assists in worrying the host. Lincoln, Shropshire, and Dorset Horn rams have been the means of spreading lice everywhere they have been taken. Ewes become infested at mating time, and are carrying a full supply when their lambs appear. The parasite evinces a particular liking for lambs, and speedily multiplies on them, reducing their condition and the owners' profits. Owners buying rams—particularly the Longwool varieties—will do well to dip them before putting them with the ewes.

The only known remedy for lice is to dip the infested sheep in some of the best-known poisonous powder dips, and, as the eggs are likely to escape destruction in the first dipping, a careful examination should be made in a few weeks, when a second dipping may be advisable. New Zealand authorities assert that sheep need to be dipped twice to thoroughly cleanse them.

## NATIVE BIRDS PROTECTION ACTS.

### DESTRUCTION OF NATIVE BIRDS.

Notwithstanding the many insect pests which damage or destroy crops of all descriptions, it seems impossible to impress upon the holiday-maker's mind that, were it not for insectivorous birds, these pests would increase to such an extent as to make the raising of field crops, vegetables, and fruit too expensive a business to be profitable. Even a gun tax, to include the mischievous pea-rifle, would be powerless to protect the birds, in consequence of the practical impossibility of enforcing it in country districts. Whilst the legitimate sportsman carefully observes the close season for game birds, the boy with the pea-rifle is troubled with no conscientious scruples on that score. He looks upon every member of the feathered tribe which comes within reach of his weapon as the legitimate object of his nefarious sport. If the attention of these shooters were directed only towards the fruit or leaf

eating birds, no objection could be raised towards their sacrificing thousands of them. Unfortunately, they cannot discriminate between useful and destructive birds; and who is there to teach them? If every State and private school were supplied with well-executed coloured plates of both classes, the teachers would be able to do a great deal towards minimising the evil. We proposed at one time to issue with every Journal one or two such coloured plates, but, unfortunately, these are expensive, and the times have of late been too bad to enable us to carry out the idea. But we shall by no means lose sight of it. Take a few of our insectivorous birds, such as crows, ibis, curlews, owls, night-jars (otherwise moreporks), &c. The crow is generally cunning enough to distinguish between a stick and a gun, and less frequently falls a victim to the gunner. Crows, although they are notorious for destroying chickens, young birds, hares, &c., yet render signal service to the farmer by destroying mice, cutworms, wireworms, &c. It has been calculated in Germany by Herr Rörig that "a field mouse and its progeny will destroy 1,000 plants of grain whilst the latter are developing." We know what tremendous losses the plague of mice inflicted on farmers last year. He also stated that "About 3,000 crows, by destroying mice and other vermin, benefit farmers to the amount of £2,500 per annum. In other words, what is commonly but erroneously known as the carrion crow benefits him to the amount of 11d. per bird per annum over and above the loss it causes him by the destruction of chickens, eggs," &c. Anyone who has watched the flocks of ibis on newly-ploughed land, thrusting their long curved bills deep into the soil, and devouring thousands of worms, grubs, beetles, and larvæ, must be impressed with the great value of these birds; yet how often are they shot in mere wantonness and left to rot on the ground? The number of mice consumed by owls is something incredible.

In 1905 we were indebted to Mr. Hy. Tryon, Government Entomologist and Vegetable Pathologist, for the following information on the food of various birds. He has closely studied their habits and examined their stomachs. This scientific phase of the question we do not attempt to deal with; the object of this article is to draw attention to the indiscriminate shooting of birds, destructive or useful, for no other purpose but sport, or "to keep one's hand in," as swallow and marten shooters express it:—

## INSECTIVOROUS AND PARTLY INSECTIVOROUS BIRDS.

*Ibis.*—The food of the birds comprised by this name consists of frogs, especially in the tadpole state, grasshoppers, grass-eating caterpillars, ground-frequenting caterpillars, soil-frequenting "grubs" generally, young fish, &c.

*Carrion Crow.*—No bird in Australia bears this name that may be erroneously bestowed on the common crow or raven, or on the white-eyed crow, both of which possess feeding habits distinct from those of the European "carrion crow." The food of the bird of coastal Queensland, the former of the two kinds mentioned, includes grasshoppers, locusts, cicadas, moths, grass-eating caterpillars, soil-frequenting grubs,

and large insects generally. Ticks, rats and mice, eggs of poultry and wild birds, young chickens and ducks (exceptionally); seeds of cereals when broadcasted, plantlets of cereals, maize from the cob (exceptionally), lambs, the eyes of cast ewes and of bogged sheep and cattle; fruit, *e.g.*, pineapples and watermelons; carrion and offal generally.

*Pied Crow* (*Shrike*).—Insects of various kinds, especially the larger ones—*e.g.*, grasshoppers, locusts, &c.; seeds, berries of wild and cultivated trees, coffee berries, fruit generally—oranges, figs, grapes, strawberries, to most kinds of which it is highly destructive; carrion, including dead birds, &c.

*Morepork* (Ninix).—The smaller kinds feed on various nocturnal insects, on rodents, on small birds, on young domesticated pigeons. The largest kinds the same, and on birds as large as a laughing jackass—*Decelo sp.* (Brennan).

*Night-jar.*—On various nocturnal flying insects, and especially on moths.

*Laughing Jackass.*—On large insects, grasshoppers, locusts, &c., lizards, iguanas (small), snakes, small rodents (rats and mice), chickens, young birds.

*Kingfishers* (1. *Halcyon*).—Feed on grasshoppers, mantidæ, noctuid caterpillars, lizards (small), tree frogs, spiders, tipulid flies, beetles, white-ants.

*Kingfishers* (2. *Alcyone*).—Small fish, aquatic insects, flying insects hovering over water.

*Butcher Birds* (*Cracticus spp.*).—Feed on large insects (grasshoppers, &c.), small lizards and other reptiles, small snakes, caterpillars, soil-frequenting "grubs," small rodents (mice, &c.), nestling birds, small birds both wild and domesticated, very young chickens, hive bees (exceptionally).

*Dollar Birds.*—Insects (especially beetles) occurring on the wing and in tree-tops; hive bees (exceptionally).

The whole of the State is now under the operation of the Acts, and Queensland is divided into two districts, for which two distinct close seasons are provided. New names have been included in the lists of protected birds. Schedule A contains the names of those totally protected, while in Schedule B will be found those to which partial protection only is afforded. Considering the valuable asset insectivorous birds are to the State, and especially to those people whose occupation is connected with the land, there should be ready assistance given to the Department in the protection of our native birds. It should be noted that any person can prosecute under the Acts.

Reserves can be proclaimed with the consent of the owner or occupier of private lands, and rangers (honorary) appointed when a reserve has been created.

The following particulars—showing the birds which are subject to the operation of the Native Birds Protection Acts, the periods of the year during which the Acts are in operation, and the reserves set apart for the preservation and protection of such birds—are published for general information:—

# BIRDS ABSOLUTELY PROTECTED THROUGHOUT QUEENSLAND.

## SCHEDULE A.

| Common Name. | Technical Designation. |
|---|---|
| Australian Bee-eaters ... ... ... ... | Merops |
| Babblers ... ... ... ... ... ... | Timeliidæ |
| Bell Birds ... ... ... ... ... ... | Oreoica |
| Bitterns ... ... ... ... ... ... | Ardeiformes |
| Black Cockatoos of all species ... ... | Calyptorhynchus |
| Black Swans ... ... ... ... ... | Anatidæ |
| Bower Birds of all species ... ... ... | Ptilonorhynchidæ |
| Bush Chats of all species ... ... ... | Ephthianurinæ |
| Cassowaries ... ... ... ... ... ... | Casuariidæ |
| Caterpillar-eaters ... ... ... ... ... | Campophagidæ |
| Coachwhip Birds ... ... ... ... ... | Timeliidæ |
| Coucals or Swamp Pheasants ... ... ... | Centropodinæ |
| Cuckoo Shrikes ... ... ... ... ... | Campophagidæ |
| Cuckoos of all species ... ... ... ... | Cuculidæ |
| Diamond Birds (Pardalotes) ... ... ... | Dicæidæ |
| Dollar Birds (Rollers) ... ... ... ... | Eurystomus |
| Egrets of all species ... ... ... ... | Ardeiformes |
| Fantails ... ... ... ... ... ... | Muscicapidæ |
| Field Wrens ... ... ... ... ... | Timeliidæ |
| Flower-peckers ... ... ... ... ... | Dicæidæ |
| Fly-catchers (Wagtails) ... ... ... ... | Muscicapidæ |
| Fly-eaters ... ... ... ... ... ... | Muscicapidæ |
| Frogmouths ... ... ... ... ... ... | Podargidæ |
| Grebes ... ... ... ... ... ... | Podicipedidæ |
| Herons ... ... ... ... ... ... | Ardeiformes |
| Honey-eaters (except Miners, Wattle Birds, Friar Birds) | Meliphagidæ |
| Ibises ... ... ... ... ... ... | Ardeiformes |
| Jabirus ... ... ... ... ... ... | Ardeiformes |
| Kingfishers (all species) ... ... ... ... | Alcedinidæ |
| Kites ... ... ... ... ... ... ... | Elanus |
| Land Curlews or Stone Plovers ... ... | Œdicnemidæ |
| Larks of all species ... ... ... ... | Motacillidæ, Alaudidæ |
| Laughing Jackasses ... ... ... ... | Alcedinidæ |
| Lyre Birds ... ... ... ... ... ... | Menuridæ |
| Magpies ... ... ... ... ... ... | Gymnorhina |
| Magpie Larks ... ... ... ... ... | Grallina |
| Martins ... ... ... ... ... ... | Hirundinidæ |
| Nightjars or Goat-suckers ... ... ... | Caprimulgidæ |
| Nuthatches or Tree-runners (Woodpeckers) | Sittidæ |
| Owls ... ... ... ... ... ... ... | Strigidæ |
| Parras ... ... ... ... ... ... | Parridæ, Glareolidæ |
| Parrots (Ground or Swamp) ... ... ... | Pezoporus |
| Pipits ... ... ... ... ... ... ... | Motacillidæ, Alaudidæ |
| Pittas of all species ... ... ... ... | Pittidæ |
| Pratincoles ... ... ... ... ... ... | Parridæ, Glareolidæ |
| Regent Birds ... ... ... ... ... | Genus Sericulus (Ptilonorhynchidæ) |
| Rifle Birds ... ... ... ... ... ... | Paradiseidæ |
| Robins of all Species ... ... ... ... | Muscicapidæ |
| Satin Birds ... ... ... ... ... ... | Genus Ptilonorhynchus (Ptilonorhynchidæ) |
| Shining Starlings (Calornis) ... ... ... | Eulabetidæ |
| Shrike Tits ... ... ... ... ... ... | Muscicapidæ |
| Song Larks ... ... ... ... ... ... | Timeliidæ |
| Spoonbills ... ... ... ... ... ... | Ardeiformes |
| Storks ... ... ... ... ... ... | Ardeiformes |
| Swallows ... ... ... ... ... ... | Hirundinidæ |
| Swamp Pheasants ... ... ... ... ... | Centropodinæ |
| Swifts ... ... ... ... ... ... | Cypselidæ |
| Thickheads (Whistlers) ... ... ... ... | Muscicapidæ |
| Thrushes of all species ... ... ... ... | Turdidæ, Prionopidæ |
| Tit Warblers (Tree Tits) ... ... ... ... | Sylviidæ |
| Tree-creepers ... ... ... ... ... | Climacteris |
| Tree-runners ... ... ... ... ... | Sittidæ |
| Warblers ... ... ... ... ... ... | Sylviidæ |
| White-eyes or Silver-eyes ... ... ... | Zosteropidæ |
| Wood Swallows ... ... ... ... ... | Artamidæ |
| Wren Warblers ... ... ... ... ... | Sylviidæ |
| Wrens of all species ... ... ... ... | Sylviidæ |

# BIRDS PARTIALLY PROTECTED THROUGHOUT QUEENSLAND.

## SCHEDULE B.

| Common Name. | Technical Designation. |
|---|---|
| Bronzewing Pigeons | Columbæ |
| Brown Hawks | Falconidæ |
| Bustards or Plain Turkeys | Otididæ |
| Coots | Rallidæ |
| Cranes | Gruidæ |
| Crakes | Rallidæ |
| Curlews | Charadriidæ |
| Dottrels | Charadriidæ |
| Doves | Columbæ |
| Ducks, Wild, of all species | Anatidæ (excepting Black Swans) |
| Emus | Dromæidæ |
| Fig Birds | Oriolidæ |
| Finches (including Plumhead, Banded, Painted, Zebra, and Redheaded Finches, &c.) | Ploceidæ |
| Geese, Wild | Anatidæ (excepting Black Swans) |
| Land Rails | Rallidæ |
| Mallee Fowls | Megapodiidæ |
| Moor Hens | Rallidæ |
| Native Companions | Gruidæ |
| Native Hens | Rallidæ |
| Orioles | Oriolidæ |
| Pigeons, all Wild | Columbæ |
| Plovers | Charadriidæ |
| Quails | Phasianidæ, Turnicidæ |
| Rails, Land and Water | Rallidæ |
| Scrub or Brush Turkeys | Megapodiidæ |
| Scrub Fowls | Megapodiidæ |
| Sea Birds, all | |
| Turkeys, Plain and Scrub or Brush | Otididæ and Megapodiidæ |
| Waders | Charadriidæ |
| Water Rails | Rallidæ |

*Close Seasons.*

In District No. 1, from the first day of September in each year to the thirty-first day of March in the following year, inclusive.

In District No. 2, from the first day of November in each year to the thirty-first day of May in the following year, inclusive.

(With the exception of emus on prickly-pear infested lands, where the close season shall be from the first to the seventh day of July in each year.)

For districts, *see* map.

## PENALTIES.

If any person shall wilfully kill or destroy any protected native bird, or shall use any instrument whatever, net, or other means for the purpose of killing or destroying any native birds, within the periods hereinbefore mentioned, such person shall, upon conviction, **pay a fine of not less than one pound or more than five pounds.**

If any person shall buy, sell, or knowingly have in his possession, house, or control any native bird at any time within the period hereinbefore mentioned, he shall **pay a penalty not less than one pound or more than five pounds for every bird.**

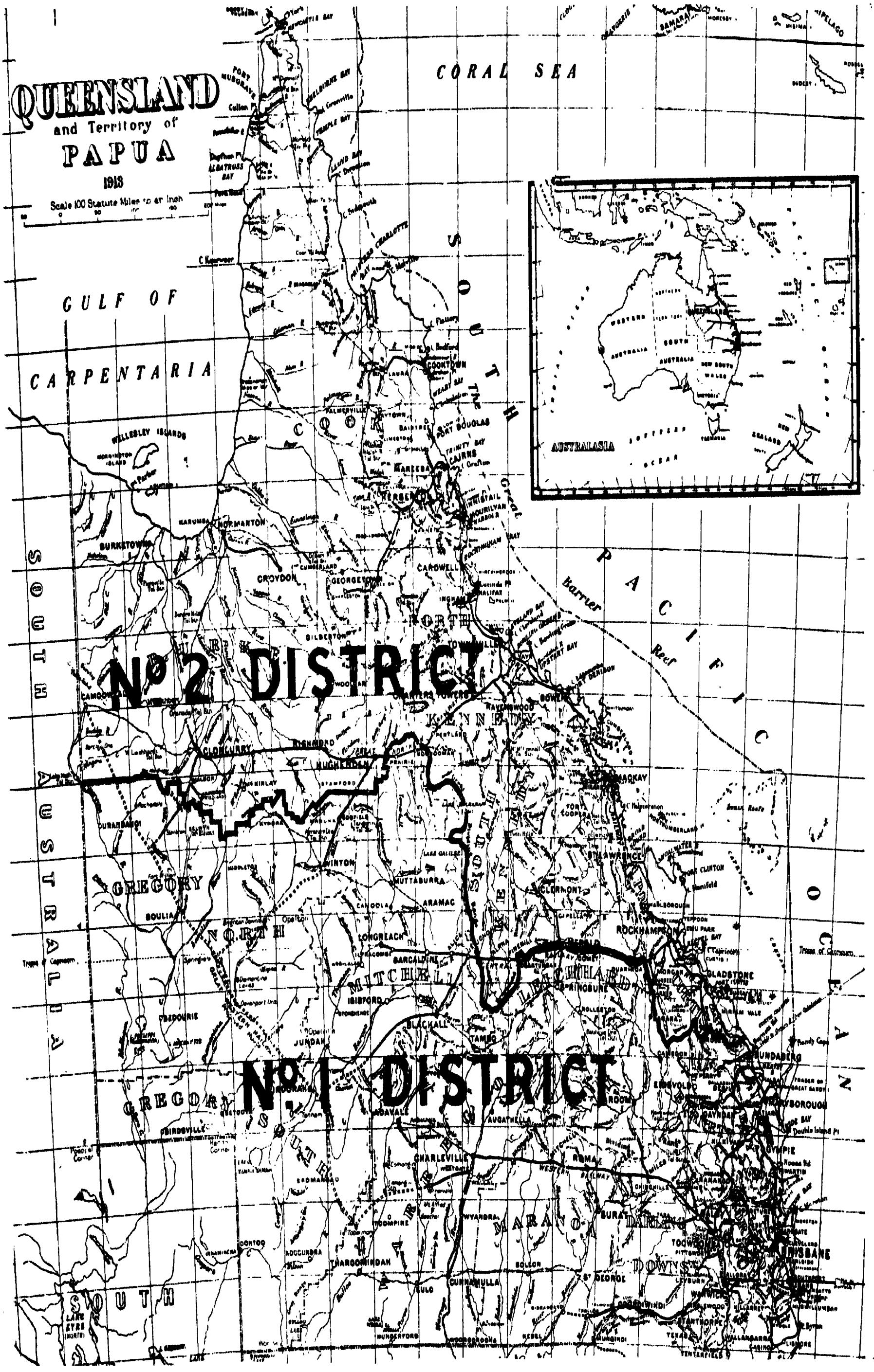
If any person wilfully kills, destroys, or captures any native bird, or uses any instrument, net, or any other means whatever for the purpose of killing, destroying, or capturing any such bird, while it is within or flying over a reserve, he shall be liable upon conviction to pay **a fine of not less than one pound or more than five pounds.**

A moiety of every penalty recovered under the Act shall be paid to the person or persons laying the information.

# LIST OF RESERVES WITHIN WHICH THE DESTRUCTION OF NATIVE BIRDS IS PROHIBITED DURING THE WHOLE YEAR.

| Situation of Reserve. | For Proclamation and Boundaries *see Government Gazette.* Date. | Part. | Page. |
|---|---|---|---|
| Parish of Enoggera, county of Stanley (Enoggera Reservoir and Catchment Area) | 29 Aug., 1885 | II. | 769 |
| Parish of Gracemere, county of Livingstone ... ... | 29 Aug., 1885 | II. | 769 |
| Parishes of Toorbul, Beerwah, and Bribie, county of Canning (Pumice Stone Channels and the shores thereof) | 12 Sep., 1885 | II. | 897 |
| **Parishes of Crow's Nest and Douglas, counties of Cavendish and Aubigny* | 10 Oct., 1885 | II. | 1253 |
| **Parish of Emu Creek, county of Cavendish* ... ... | 10 Oct., 1885 | II. | 1253 |
| **Parish of Douglas, county of Aubigny* ... ... ... | 10 Oct., 1885 | II. | 1253 |
| Parish of Nerang, county of Ward, Southport ... ... | 5 June, 1886 | I. | 1946 |
| Parishes of Moggill and Indooroopilly, county of Stanley (Gold Creek and Moggill Creek Drainage Areas) | 13 July, 1889 | II. | 797 |
| Parish of Boonara, county of Mackenzie (on the leased part of Boonara Run) | 14 Sep., 1889 | III. | 99 |
| Parishes of Enoggera and Indooroopilly, county of Stanley (Mount Coot-tha Reserve) | 20 Dec., 1890 | III. | 1403 |
| Parish of Oxley, county of Stanley (Chelmer Recreation and Water Reserve) | 4 Mar., 1893 | I. | 670 |
| Parish of Hewittville, county of Livingstone (Reserve for Water, Emu Park) | 18 July, 1893 | II. | 583 |
| Parish of Ossa, county of Carlisle, Seaforth ... ... | 1 Jan., 1898 | I. | 21 |
| Parishes of Cressbrook, Bowman, and Neara, county of Canning | 11 June, 1898 | I. | 1596 |
| Lake Clarendon ... ... ... ... ... ... ... ... | 24 Mar., 1900 | I. | 961 |
| England and Clarendon ... ... ... ... ... ... | 25 June, 1900 | I. | 1650 |
| Fitzroy, Nicholson, Faraday, Calioran ... ... ... | 6 July, 1901 | II. | 564 |
| Gavial and Gracemere (The Duck Pond) ... ... ... | 13 July, 1901 | II. | 633 |
| Horseshoe Lagoon, parish of Selkirk ... ... ... | 16 Aug., 1902 | II. | 421 |
| Cloyna ... ... ... ... ... ... ... ... ... | 28 Dec., 1901 | III. | 990 |
| Parishes of Antill and Jarvisfield ... ... ... ... | 30 July, 1904 | II. | 249 |
| Parish of Jarvisfield (Church Lagoon) ... ... ... | 30 July, 1904 | II. | 249 |
| Ditto (Red Lily Lagoon) ... ... ... | 30 July, 1904 | II. | 249 |
| Parish of Rockhampton (Murray's and Jardine's Lagoons) | 27 Aug., 1904 | II. | 493 |
| Parish of Charters Towers (Burdekin Weir) ... ... | 29 Oct., 1904 | II. | 901 |
| Dunk, Kumboola Island, and Mount Islet, the Family Islands (comprising Thorpe, Richards, Wheeler, Coombe, Bowden, Smith, and Hodson Islands), and Brooks Islands | 13 May, 1905 | I. | 1546 |
| Parish of Yeerongpilly (Russell Wilkins) ... ... | 16 Dec., 1905 | II. | 1273 |
| Ditto (Water Reserve) ... ... | 16 Dec., 1905 | II. | 1273 |
| Parish of Enoggera (Private lands on Toowong Creek) | 11 Aug., 1906 | II. | 274 |
| Parish of Yaamba (P. F. MacDonald's property) ... | 8 Sep., 1906 | II. | 514 |
| Parish of Noogoon (Mud Island) ... ... ... ... | 8 Dec., 1906 | II. | 1195 |
| Parish of Broadmere (Lake Murphy ... ... ... | 13 Feb., 1909 | I. | 341 |
| County of Stanley (The Redcliffe Shire) ... ... ... | 20 Mar., 1909 | I. | 738 |
| Parishes of Wyseby and Aubrey (Stud Farm for Breeding Police Horses) | 10 July, 1909 | II. | 70 |
| Parish of Pentland (Pentland Dam and Swamp) ... ... | 24 July, 1909 | II. | 220 |
| Parish of Dugandan (A. J. McConnell's property) ... | 4 Sep., 1909 | II. | 587 |
| County of Nares (The Douglas Shire) ... ... ... | 16 April, 1910 | I. | 1002 |
| County of Elphinstone (Abattoir Reserve, Townsville) ... | 21 May, 1910 | I. | 1326 |
| Parish of Taylor, Toowoomba District (Jubilee Park), Redwood Park, Picnic Point, and One-tree Hill) | 8 Oct., 1910 | II. | 1010 |
| Parish of Tingalpa (Shire of Wynnum) ... ... ... | 18 Feb., 1911 | I. | 930 |
| Gladstone Land Agent's District (Capricorn Group of Islands) | 5 Aug., 1911 | II. | 422 |
| Mackay Land Agent's District (Orphanage Swamp and Denman's Water Hole) | 23 Sep., 1911 | II. | 820 |
| Parishes of Rockybar and Eumara (Reeves Lake, &c., on Eumara and Gainsford Holdings) | 29 June, 1912 | I. | 1711 |
| Shire of Widgee ... ... ... ... ... ... ... ... | 20 Dec., 1913 | II. | 1741 |
| Parish of Stradbroke (Myora) ... ... ... ... ... | 11 April, 1914 | I. | 1036 |
| Shire of Maroochy ... ... ... ... ... ... ... | 2 May, 1914 | I. | 1173 |
| County of Ward, area on coast from Southport to Pt. Danger | 4 July, 1914 | II. | 78 |

*** Note.—These reserves are for the protection of the following birds only:—Tallegallas or Scrub Turkeys, Bronzewing and all Wild Pigeons, Emus, Regent Birds, Quails.**


QUEENSLAND
and Territory of
PAPUA
1913
Scale 100 Statute Miles to an Inch
CORAL SEA
GULF OF
CARPENTARIA
SOUTH PACIFIC OCEAN
The Great Barrier Reef
AUSTRALASIA
SOUTH AUSTRALIA
Nº 2 DISTRICT
Nº 1 DISTRICT
COOK
NORTH KENNEDY
SOUTH KENNEDY
GREGORY NORTH
GREGORY SOUTH
MITCHELL
LEICHHARDT
WARREGO
MARANOA
DARLING DOWNS
SOUTH
NORMANTON
BURKETOWN
CROYDON
COOKTOWN
CAIRNS
TOWNSVILLE
CHARTERS TOWERS
CLONCURRY
HUGHENDEN
WINTON
MACKAY
ROCKHAMPTON
LONGREACH
BARCALDINE
BLACKALL
CHARLEVILLE
ROMA
TOOWOOMBA
BRISBANE
BUNDABERG
MARYBOROUGH
GYMPIE
GLADSTONE
BOULIA
BIRDSVILLE
CUNNAMULLA
GOONDIWINDI
WARWICK
ST GEORGE

## TRIMMING HIDES.

Winchcombe, Carson, Limited, Sydney, hand us ("Pastoral Review") the following instructions showing how to trim hides according to selling regulations:—

Fore leg to be taken off above the knee (V-shaped inwards). Hind leg at second joint, or hock (V-shaped inwards), no pocket to be left. Tail to be cut off within 2 in. of body. Forehead, ears, lips, udders, and testicle bags to come off. Cheeks to be rounded off, and all useless long pieces on any part of the hide to be cut off.

In regard to curing, make a table on the ground slightly raised in the middle and sloping each side to allow brine to run off. Place the hide—hair side down—on table and cover flesh side with coarse salt—seeing that the edges are not neglected. Stack hide upon hide—always keeping the pelt side up—until a heap is formed. Leave for about a week and then take off, shake salt off, and roll into bundles.

## EFFECT OF SMOKE ON STOCK FARMING.

In connection with the investigations carried on at Leeds University on the effect of atmospheric impurities on vegetation, an inquiry was addressed to the farmers of the district with regard to the effect of town smoke on stock farming. The results show that a polluted atmosphere is deleterious to both cattle and horses; young stock do not thrive, and adult stock require more food and greater care than similar animals in a less contaminated atmosphere, the ill effects being due partly to the direct respiration of the smoke-laden air, and partly to the effects of the smoke on the grass. Sheep are rarely seen in these districts, as, in addition to the difficulties of rearing and fattening stock, the depreciation in the market value of the animals as a result of the blackening of the wool by smoke has to be taken into account. The harmful effect of a smoky atmosphere seems to be cumulative from generation to generation.—"The Journal of the Board of Agriculture."

## PRESERVATION OF HIDES AND SKINS.

In view of the large exports of hides and skins to meet the requirements of the markets of the United Kingdom and the unsatisfactory condition in which they are reported to arrive at their destination, a recent number of the "Bulletin of the Imperial Institute" gives a number of methods in use for the preservation of hides. Many of these, it says, are unsatisfactory, the hide itself being sometimes damaged by the careless treatment it receives. And the method recommended as the most satisfactory is that known as the "wet-salted method." The skin while being flayed should be prevented from coming in contact with dirt or blood, and should be allowed to fall into a basket or other receptacle, where it is left to cool. It is then washed thoroughly and afterwards drained to remove the excess of water. The skin should then be laid out

flat on a clean floor or a suitable low table, flesh side uppermost, care being taken that every part of the flesh side is exposed. Salt is spread evenly over the whole area of the flesh side; and another hide, similarly treated, placed on top; and the process repeated until a pile about 4 ft. high has been raised. Each skin should be given a quantity of salt equal to 25 per cent. of its weight, and it should be seen that the top skin is well covered over. Where large numbers of hides are being treated, the piles may be built differently; but in whatever way it is done the hides should have plenty of salt. The skins are left in these piles until all the salt has been absorbed, which generally takes about a week; and should they not be "salt-firm"—that is, free from excessive moisture—at the end of this period they are again salted. As soon as the skins are salt-firm they may be baled for transport.

In the case of wool skins, particular care should be taken to prevent moisture coming in contact with the wool during the flaying process. In this case the salting is performed by laying the skins out flat after cooling and rubbing the salt into the flesh side, then folding the skins from belly to belly and baling them for shipment in this state.

The salt used should be fresh, clean, common salt, free from material deleterious to the raw hide or likely to cause trouble in subsequent treatment, while in no case should old or previously used salt be employed. Anhydrous sodium sulphate may be substituted for the common salt and applied in half the quantity—that is, at the rate of 10 to 15 per cent. of the green weight of the skins. In countries where there is a Government royalty or tax on salt, this commodity is denatured before it is put to any industrial use, in order to avoid the payment of this impost. Many materials have from time to time been employed for denaturing salt—*e.g.*, alum, soda, tar products, petroleum, &c.; but all have been a source of difficulty to the tanner, as they form undesirable combinations with the hide substance or cause stains. Recently elaborate experiments undertaken at Turin to discover a suitable denaturant showed that, provided the salt was pure, the addition of 10 per cent. of borax and 1 per cent. of naphthalene was successful, as was also the addition of 1 per cent. of naphthalene, 10 per cent. of sodium sulphate, and 0·017 per cent. of bichromate of potash. The value of the latter mixture for curing could be improved by the addition of 5 per cent. of borax.

Under certain circumstances, when it is desired to economise weight, and therefore cost of transport, it is more convenient to ship the hides in the dry state, and, should this be the case, they should be "dry-salted," if possible. The skins, after flaying, should be well washed, as in the previous method, and should then be hung up in a cool room or shed until partially dry. In this state they are spread on the floor and salted in piles, after which they are rehung until they have acquired a soft but elastic condition, when they are re-salted. This method should only be followed if it is not possible to keep the skins in the wet-salted state, since dry-salted skins are much more difficult to wash and soften for tanning. Probably, also, the crystallisation of the salt has a weakening effect on the fibre of the hide.

In some countries, where salt is dear, the distance of land transit great, and the means of transport primitive, it is only

practicable to dry the hides, without salting them. In this case they should be well washed free from blood and dirt, and in the final washing some aromatic material, such as naphthalene, tobacco juice, or some similar product obtainable locally, should be added to the bath. The skins should then be hung up by the hide flanks or over poles, with the flesh side outwards, in the shade, with a current of air circulating freely round each hide, and on no account should drying be done on the ground or in the sun. This drying ought to take place evenly and gradually, yet rapidly. If it is carried out too slowly, putrefaction sets in, while, if too rapidly, the hide cakes on the outside, and the inside is left moist and putrescible, and there is a strong probability that, in some parts, the fibrous structure will be destroyed and "blistering" will result. The sheds used for drying should be so constructed as to prevent the ingress of flies.

During the washing the skins may be treated with arsenic as a preventive of insect attack. Hides cured by this method, sometimes known as "flint hides," are always more difficult to soften han those preserved by the other methods described, and they command a lower price in the market.

## A DONKEY TEAM JOURNEY.

A team of donkeys lately arrived at Longreach after having performed the long journey from Western Australia with a load of 4½ tons. The animals, in spite of hardships on the road, kept in excellent condition.

PLATE 66.—ARRIVAL OF THE DONKEY TEAM AT LONGREACH.

# Answers to Correspondents.

## POTATO ONIONS.

G.A.F.—

Kindly send further particulars, and give us the name of your locality, as it is not legible in your letter.

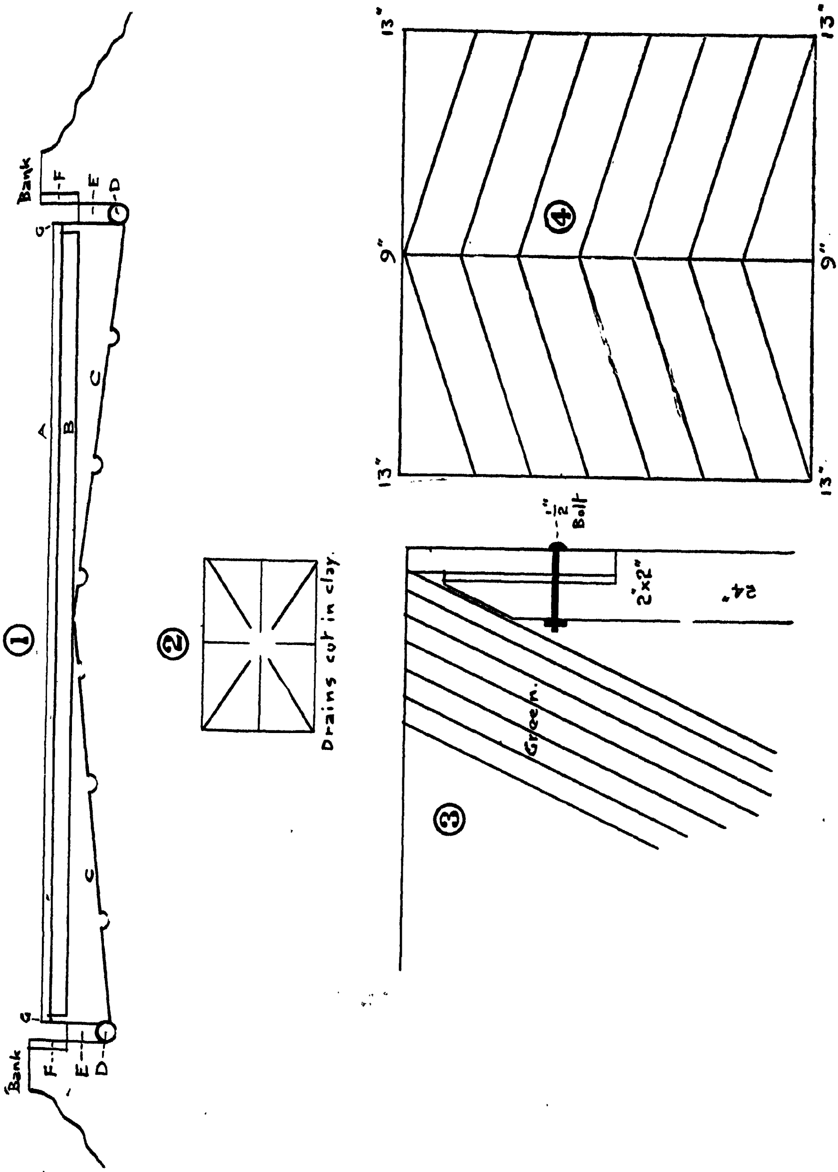
## HOW TO LAY DOWN A BOWLING GREEN.

LAWN, Maryborough—

The accompanying plan (cross section) of the Ascot Vale Club Green, Melbourne, kindly supplied to us by Mr. D. S. Warren, hon. secretary of the Sandgate Bowling Club, gives a very clear idea of the nature of the work in laying down a green.

Mr. Warren has also given the following particulars of the work of making a bowling green now in progress at Sandgate:—

1. The site is on the crest of a slight elevation.
2. The dimensions of the green are 123 ft. by 120 ft.
3. The surface soil is poor with a clay subsoil.
4. The excavation varies in depth from 0 to 27 in.
5. A fall of 4 in. is being made from the middle of the green to east and west ditches. (A 6-in. fall in the full length of the green is ample.)
6. To assist drainage, a row of 2-in. agricultural pipes is being placed across the green in drains about 17 ft. apart. Joints are to be covered with metal or clinkers.
7. The foundation of the site is solid, and no metal, &c., is being used; but to assist drainage sea sand running from 0 in. in the middle to 4 in. at east and west ditches is being used.
8. The kerbing is to be 9 in. by 2 in. hardwood. Stay posts 31 in. long are to be placed about 6 ft. apart and sunk from 20 in. to 24 in. in the ground. The posts are to be on the inside of the green, and the kerbing is to be bolted to each. All wood is to be tarred.
9. The best of the soil excavated and an equal quantity of sand (not sea sand) are to be used in filling the area enclosed by kerbing; the last 4 or 5 in. being screened.




CROSS SECTION OF THE ASCOT VALE CLUB GREEN, MELBOURNE.

A—Surface of green, about ½-in.-fine black sand.
B—About 5 in. screened ashes and loam mixed (3 of loam, 2 of ashes).
C—Coarse ash-bed on top of clay, with cart wheel drains cut in clay, radiating from centre to drains in ditch.
D—Agricultural drain pipes.
E—Ash.
F—Bank faced with Buffalo sods.
G—Plinth, 6 in. by 2 in.

This green is in the form of an inverted saucer in the excavation. It cost £28 per rink for the green itself, as shown above.

10. Every 3 or 4 in. filled in will be rolled with a light roller.

11. To enrich the soil, we have been advised to spread about 10 cwt. of bonemeal over the soil prior to filling in the last 2 in., or to mix it with the soil when screening.

12. We intend chipping ordinary couch grass (not blue or so-called New Zealand couch) found in the streets, and strewing it over the prepared surface and giving it a slight dressing of soil.

13. Ditches will be about 18 in. wide, and 4-in. agricultural pipes will be inserted to carry off drainage.

14. In order to avoid the necessity for deep excavation, we are building up nearly all our banks with the surplus soil excavated.

NOTES.—(*a*) Clinkers could be used where we are using sea sand. (*b*) Cow manure would probably be the means of introducing many weeds into the soil. (*c*) If the natural soil is sufficiently porous, no sand would be necessary, as in our case; but cinders could be mixed with soil, as recommended in the notes on the Ascot Vale Club Green.

# The Markets.

## PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR AUGUST, 1914.

| Article. | | AUGUST. Prices. |
|---|---|---|
| Bacon | lb. | 9d. to 10½d. |
| Bran | ton | £6 10s. |
| Butter | cwt. | 112s. |
| Chaff, Mixed | ton | £6 to £6 10s. |
| Chaff, Oaten (Victorian) | „ | £6 |
| Chaff, Lucerne | „ | £6 5s. to £6 15s. |
| Chaff, Wheaten | „ | £4 10s. |
| Cheese | lb. | 7½d. |
| Flour | ton | £9 |
| Hams | lb. | 1s. 1d. to 1s. 2d. |
| Hay, Oaten (Victorian) | ton | £6 5s. to £6 10s. |
| Hay, Lucerne (Prime) | „ | £4 10s. to £5 10s. |
| Honey | lb. | 2½d. to 2¾d. |
| Maize | bush. | 3s. 5d. to 3s. 6d. |
| Oats | „ | 3s. 7d. to 3s. 11d. |
| Onions | ton | £9 10s. to £10 |
| Peanuts | lb. | 3d. to 3¼d. |
| Pollard | ton | £6 10s. |
| Potatoes | „ | £8 10s. to £9 |
| Potatoes (Sweet) | cwt. | 2s. 9d. to 3s. |
| Pumpkins | ton | £2 5s. |
| Wheat, Milling | bush. | 3s. 11d. to 4s. 1d. |
| Eggs | doz. | 7½d. to 9d. |
| Fowls | pair | 3s. 3d. to 5s. 3d. |
| Geese | „ | 5s. 9d. |
| Ducks, English | „ | 2s. 9d. to 3s. 7d. |
| Ducks, Muscovy | „ | 4s. to 5s. 6d. |
| Turkeys (Hens) | „ | 5s. 6d. to 7s. 6d. |
| Turkeys (Gobblers) | „ | 10s. to 14s. |

## SOUTHERN FRUIT MARKETS.

| Article. | AUGUST. Prices. |
|---|---|
| Bananas (Queensland), per case | 12s. |
| Bananas (Fiji), per case | 17s. to 18s. |
| Mandarins (Queensland), per case | 7s. to 9s. |
| Oranges (Navel), per case | 13s. |
| Oranges (other), per case | 7s. to 9s. |
| Passion Fruit, per half-case | 5s. to 7s. |
| Pineapples (Queensland), (Queens), per case | 7s. |
| Pineapples (Ripleys), per case | 7s. 6d. |
| Pineapples (commons), per case | 6s. to 7s. |
| Tomatoes, per quarter-case | 3s. 6d. to 4s. 6d. |

## PRICES OF FRUIT—TURBOT STREET MARKETS.

| Article. | AUGUST Prices. |
|---|---|
| Apples, Eating (Local), per case | 8s. to 10s. |
| Apples (Cooking), per case | 7s. 6d. to 9s. |
| Bananas (Cavendish), per dozen | 2d. to 3d. |
| Bananas (Sugar), per dozen | 1d. to 2¼d. |
| Cocoanuts, per sack | 12s. to 14s. |
| Cumquats, per quarter-case | 1s. 6d. to 2s. 3d. |
| Custard Apples, per quarter-case | 4s. to 5s. 2d. |
| Lemons (Local), per case | 5s. to 7s. |
| Lemons (Italian), 160 fruits, per case | 3s. to 4s. |
| Mandarins, per case | 6s. to 10s. |
| Oranges, per case | 3s. 6d. to 6s. |
| Papaw Apples, per quarter-case | 1s. to 2s. |
| Passion Fruit, per quarter-case | 6s. to 7s. |
| Peanuts, per pound | 3d. to 3¼d. |
| Pineapples (Ripley), per dozen | 1s. to 2s. |
| Pineapples (Rough), per dozen | 4d. to 9d. |
| Pineapples (Smooth), per dozen | 1s. 6d. to 2s. |
| Strawberries, per tray | 1s. to 2s. |
| Tomatoes, per quarter-case | 3s. to 4s. 6d. |

## TOP PRICES, ENOGGERA YARDS, JULY, 1914.

| Animal. | JULY. Prices. |
|---|---|
| Bullocks | £11 12s. 6d. to £14 5s. |
| Cows | £8 7s. 6d. to £10 10s. |
| Merino Wethers | 34s. 3d. |
| Crossbred Wethers | 29s. 9d. |
| Merino Ewes | 26s. |
| Crossbred Ewes | 27s. 6d. |
| Lambs | 22s. 6d. |
| Pigs (Baconers) | 74s. |
| Pigs (Porkers) | 48s. |

# Farm and Garden Notes for October.

FIELD.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, sorghum, setaria, imphee, prairie grass, panicum, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred. Cotton may still be sown.

KITCHEN GARDEN.—Our notes for this month will not vary much from those for September. Sowings may be made of all kinds of vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascar beans should also be sown. Sow the dwarf Lima beans in rows 3 ft. apart with 18 in. between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the plants will be drawn and worthless. Thin out melon and cucumber plants. Give plenty of water and mulch tomato plants planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

FLOWER GARDEN.—The flower garden will now be showing the result of the care bestowed upon it during the past two months. The principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant chrysanthemums, gladiolus and other bulbs, such as tube-rose, crinum, ismene, amaryllis, pancratium, hermocallis, hippeastrum, dahlia, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphis, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.

# Orchard Notes for October.

## THE SOUTHERN COAST DISTRICTS.

As October is often a dry month throughout the greater part of the State, one of the most important duties of the fruit-grower is to keep his orchard or vineyard in a thorough state of cultivation, thus retaining the moisture in the soil that is essential to the setting and development of the fruit crop. As long as the land is level one cannot over-cultivate, as there is no danger of the soil washing, but when the orchard is on a hillside heavy thunderstorms, which may occur during the month, are very apt to cause heavy washaways of soil if the land is kept in the high state of tilth necessary to retain moisture. In this case the cultivation should always be across and not up and down the face of the hill, and where the soil is of such a nature that it will wash badly thin blocks, consisting of a row or two of a growing crop or of light timber, brushwood, or even a body of weeds or heavy mulching, should be provided, such blocks to follow the contour of the orchard. If dry, and water for irrigation is available, citrus trees will be the better for a thorough watering during the month. Give the trees a good soaking, and follow the irrigation by systematic cultivation, as this is much better than constant surface watering, as practised by the Chinese. Examine the orchard and vineyard carefully for pests of all kinds. When young trees are showing signs of scale insects, cyanide same; when leaf-eating insects of any kind are present, spray the plants that are being attacked with arsenate of lead. Look out carefully for black spot and oidium in grape vines, using Bordeaux mixture for the former and sulphur for the latter. When using sulphur, see that you get a fine sample—viz., one in which the particles of sulphur are in a very fine state, as the finer the sulphur the better the results. Do not apply the sulphur in the early morning, but during the heat of the day, as it is the sulphur fumes, not the sulphur, which do the good. A knapsack sulphurer is the best machine for applying sulphur to grape vines, trees, or plants.

Examine any late citrus fruits or early summer fruits for fruit-fly, and take every precaution to keep this great pest in check now, as, if fought systematically now, it will not do anything like the same amount of damage later on as if neglected and allowed to increase unchecked. October is a good month for planting pineapples and bananas. Be sure and have the land properly prepared prior to planting, especially in the case of pineapples, as the deeper the land is worked and the better the state of tilth to which the surface soil is reduced the better the results, as I am satisfied that few crops will pay better for the extra work involved than pines.

## THE TROPICAL COAST DISTRICTS.

As the fruit-fly usually becomes more numerous at this time of year, especial care must be taken to examine the fruit thoroughly prior to shipment, and to cull out all fruit that has been attacked by the fly. Banana and pineapple plants may be set out, and the orchards should be kept well tilled, so as to have the land clean and in good order before the heavy summer growth takes place.

All the spring crops of citrus fruits should be now marketed, and the trees, where necessary, should be pruned and sprayed, and the land be well ploughed. The ploughing should be followed by harrowing and cultivating, so as to get the surface of the land in good order. Granadillas and papaws should be shipped to the Southern markets, as, if care is taken in packing and they are sent in the cool chamber, they will carry in good order. These fruits should not be gathered in an immature condition, as, if so, they will never ripen up properly. They should be fully developed but not soft, and if gathered in this condition, carefully handled, and packed and shipped in cool storage, they will reach the Southern markets in good condition, and, once they become commonly known, will meet with a ready sale.

## SOUTHERN AND CENTRAL TABLELANDS.

In the Stanthorpe district the spraying of apple, pear, and quince trees for codling moth will have to be carefully carried out, the best spray being arsenate of lead, of which there are several reliable brands on the market.

When fungus diseases, such as powdery mildew, &c., are also present, Bordeaux mixture should be combined with the arsenical spray.

The vineyard will require considerable attention, as the vines must be carefully disbudded, and any signs of oidium or black spot should be checked at once. Look out for late spring frosts, and, if possible, try the effect of smudge fires producing dense smoke for preventing any damage.

Keep the orchards and vineyards well cultivated, as it is of the utmost importance to keep the moisture in the soil at this time of the year if a good fruit crop is to be secured.

In the warmer districts cultivation is all-important, and when irrigation is available it should be used for both fruit trees and vines, a thorough soaking followed by systematic cultivation being given.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. II. OCTOBER, 1914. PART 4.

# Agriculture.

## HOW TO GROW AN ACRE OF CORN.

The premier corn (maize) growing country of the world is undoubtedly the United States of America. There, the breeding of corn has been elevated to an exact science. Corn clubs had their origin in that country, and no expense is spared to teach the farmers the most up-to-date methods of corngrowing in order to enable them to obtain the highest returns. Now that, as we hope, many farmers' sons throughout Queensland will seize the opportunity afforded them by the Department of Agriculture and Stock to prove their ability to raise profitable crops of corn, we wish to draw the attention of young men on the land to the terms of the proposed competition as published in the September issue of the journal. The prizes to be awarded will be of the value of £5, £2, and £1 with three special prizes of the value of £10, £5, and £3, to the competitors who stand first, second, and third in the entire competition.

With a view to assisting competitors in this matter, we publish in this issue of the Journal a most valuable Bulletin issued by the United States Department of Agriculture, written by C. P. Hartley, Physiologist in Charge of Corn Investigations, under the above caption. If competitors will study the directions therein given, they will—given good conditions of soil, rainfall, &c.—run each other very close in this very important competition.

## INTRODUCTION.

For no ten-year period has the corn yield of the United States exceeded 28 bushels per acre. No State has averaged for any year over 54 bushels per acre, yet in practically every section of the United States yields of more than 100 bushels have been produced. As States and as a nation twice as much land is being used and much more labour is being performed in producing the corn crop than is necessary.

The possibility of doubling our acre yield of corn is so certain and its accomplishment of such tremendous importance that school, State, national, and independent organisations of corn clubs and associations of cornbreeders and corngrowers are helping in a way that will lead to success. Such clubs and associations are especially fitted for this most important work, for they combine the yearly experience of many and can continue their records indefinitely, each year profiting by past experiences.

In the following pages some fundamental requirements for large and profitable corn yields on 1 acre are given for the general guidance of boys, either as individuals or as members of clubs and associations. Exceptional and local conditions are not here discussed. General and fundamental requirements of the crop as gained by experiences in many parts of the United States are given as a foundation upon which to utilise and apply local experience and instructions from those possessing such experience.

## WHAT KIND OF CORN TO GROW.

Grow the kind that is likely to prove most profitable.

If near a good market for roasting ears or a canning factory sweet corn may prove most profitable, or under certain conditions pop corn might pay best.

For some sections varieties of the dent-corn group are too soft to resist decay and varieties of the flint-corn group are more profitable.

In practically every corngrowing community there is a strong demand every spring for first-class seed corn.

The acre can be made highly profitable if devoted to the growing of seed corn of the most productive variety for the neighbourhood. If the crop is sold as commercial corn, 50 or 75 cents a bushel will be received, but by selecting at the proper time all that is suitable for seed and giving it good care till planting time 2 dollars or 3 dollars a bushel can be obtained.

The variety that has generally produced the most good, sound grain in the neighbourhood is the variety to plant, and it can be greatly improved by careful seed selection. It is also the corn that will be most in demand for seed throughout the neighbourhood.

If corn throughout the county generally fails to ripen properly, take up work with an earlier maturing variety.

If the corn generally grows too tall take up work with seed from stalks that do not grow too tall.

If the most productive varieties of the neighbourhood are prolific varieties, take up work with the one that seems to have been giving most general satisfaction.

If the most productive varieties of the neighbourhood are one-eared varieties, take up work with the one that seems to have been giving most general satisfaction.

## WHEN TO TAKE UP CORN-IMPROVEMENT WORK.

Just as soon as you reach a determination to persevere until successful you should begin corn-improvement work.

Each community needs an experienced and conscientious corn-breeder.

By starting while young and keeping at it, boys have splendid opportunities to produce better varieties than have ever been produced.

The Office of Corn Investigations of the United States Department of Agriculture wants to help a boy in each county who has produced the best corn crop for a number of years to become an efficient, conscientious seed-corn grower for his county.

Some feature or other of the work needs attention at all seasons of the year.

These features must be attended to at the proper time, as success is not likely to be won by spasmodic attempts. It is usually won by perseverance, which causes each operation to be accomplished at the proper time and in the best manner.

At planting time hopes of success are usually brightest, but the exercise of ability at seed-selecting time, at ploughing time, and at many other times is necessary.

## SELECTING SEED FOR THE ACRE.

Select seed ears in the field from the very best stalks and as soon as the ears are ripe. (See "Drying and Caring for Seed-corn.")

Select at least 100 ears; 200 are much better, and it is still better if some ears of the same variety be selected from a neighbouring field or farm.

The acre is to be a seed-patch, and the improvement of a variety of corn should not begin with a small number of ears, as close breeding is likely to gradually reduce productiveness.

## PREPARING THE SEED FOR PLANTING.

Such work as sorting, testing germinating qualities, shelling, &c., should be done in the early spring before field work demands attention.

The best time to grade seed-corn is before shelling.

Only heavy, solid ears should be used for seed, and the ears chosen should contain kernels of a good uniform length, width, and thickness.

Ears containing kernels of various sizes and shapes should be discarded.

The ears can be numbered by sticking a pin through a piece of paper into the end of the cob, and ten kernels taken from each ear can then

be tested to determine whether they will grow. If weak or dead kernels are found, the ears from which they were taken should be discarded.

Before shelling, all small and poorly developed kernels should be removed from the ears, for they will produce weak and barren stalks.

If the seed is to be planted by means of a corn-planter, the large, irregular kernels from the butts of the ears should also be discarded before the ears are shelled.

The proper way to shell seed-corn is by hand, shelling one ear at a time into a coarse-meshed sieve. This enables the kernels and cob from each ear to be closely inspected and all kernels to be easily rejected if any defect is found. The sieve facilitates the separation of the chaff and other small particles from the seed.

## SELECTING AN ACRE FOR CORN.

It is better to have the seed-acre adjacent to or a part of a larger field of the same variety of corn.

An isolated acre of corn is very likely to meet with injury from live stock, squirrels, crows, chinch bugs, or grasshoppers at some time during the season.

The soil should be fertile and loose to a great depth. A good corn crop cannot be produced on hard, depleted soil.

A highly profitable corn crop depends very largely upon the selection of a fertile, well-drained location.

The acre should be uniform, so that all parts will be in proper condition for cultivation at the same time.

The nature of the season cannot be foretold; therefore it is impossible to predict whether high land or low land will produce better, but as corn makes a tall, thrifty growth, requiring much moisture, low land usually being better supplied with moisture and fertility is likely, if well drained, to produce better than high land.

Choose land that usually produces heavy crops and, if possible, land that has recently produced vigorous crops of clover, cowpeas, alfalfa, vetch, or some other legume. A heavy growth of large, vigorous horseweeds, cocklebur, or other rank-growing weeds indicates a good corn soil.

Alfalfa, clover, and similar plants send their roots to great depths and are the best crops to turn under for the purpose of growing a very large corn crop. Their culture is the best and most economical way of subsoiling land. The deep-growing roots loosen the subsoil and keep it porous long after the crop is turned under. Without sufficient rainfall unusually poor corn crops are obtained on alfalfa sod, the soil moisture having been exhausted to a great depth by the roots of the alfalfa.

Outer rows of corn are usually broken down in cultivating and are usually injured more by chinch bugs or grasshoppers from adjacent fields or by hot winds. Therefore, more than an acre should be planted, so that at least four guard rows of corn may surround the test acre.

## FERTILISING THE ACRE.

A liberal supply of soil moisture is indispensable to a good corn yield.

Well-decomposed manure is the surest fertiliser for producing a large corn crop.

Failure is quite sure to follow an attempt to grow a large corn crop on hard or depleted soil unless its hard or depleted condition is overcome by a liberal application of manure.

Barnyard manure that is well decomposed and moist can safely be applied abundantly, 20 or 40 tons to the acre.

Where rainfall is deficient, manure containing stalks or undecomposed straw may reduce the corn yield by admitting too much air into the soil and facilitating the escape of soil moisture.

Manure and decomposed vegetable matter greatly increase the water-absorbing and water-holding capacity of a soil.

Where heavy applications are made, the manure should be well mixed with the soil, and preferably this should be done several months previous to planting the corn.

Manure should be applied before its soluble parts have leached away by exposure to rain.

It is unwise to attempt to grow a profitable corn crop on hard, depleted soil by a heavy application of commercial fertilisers without improving the physical condition of the soil.

If local tests have demonstrated that a soil responds with increased yields to the application of a particular element, that element should be liberally applied.

Many soils contain an abundance of potassium, but some soils, notably some peaty soils, are so deficient in this element that they yield very unprofitable corn crops without its application and very profitable corn crops when potassium is supplied.

Some heavy clay soils and sandy soils are often improved by an application of lime, and in many localities ground phosphate rock can be profitably used in growing corn. The lime is applied to best advantage for the clover or alfalfa crop. The ground phosphate rock is best applied by composting it with manure.

Large corn crops have been grown by heavy applications of commercial fertilisers containing nitrogen, phosphorus, and potassium, but on many soils the application of all these elements is unnecessary, and the application of those not needed increases the cost of production and does not increase the yield. Nitrogen, the most expensive element of commercial fertilisers, is taken from the air and stored in the soil by the growing of legumes.

Commercial fertilisers should be applied broadcast. The corn roots ramify throughout the soil and utilise fertilisers so applied to better advantage than when they are applied directly in the row or hill.

If 300 lb. or more per acre of commercial fertilisers be placed in direct contact with the kernels, they are liable to be killed or so injured that the yield may be reduced.

## PREPARATION OF THE SEED-BED.

Land is ploughed in order to loosen it and enable water to enter in greater quantity, be absorbed to greater depth, and remain longer in the soil.

A deep seed-bed well supplied with soil moisture and well drained makes a big corn yield possible whether the summer proves "too dry" or "too wet."

If not well ploughed, some lands are so impervious that during several weeks of rainy weather they remain dry below a depth of 5 or 10 in.

In many localities it is best to plough in the fall or several months before planting, in order to enable the soil to store a sufficient amount of water to produce a corn crop. In some localities it is necessary to grow rye or some other crop on fall-ploughed land to prevent erosion.

Heavy cover crops should be turned under in the fall, winter, or very early spring in order to give time for decay before corn is planted on the land.

Land should never be ploughed when too wet to pulverise finely. In the fall, ploughing may be done even when the ground is too dry, as winter rains and freezing will pulverise the clods.

If ploughing is done in the spring shortly before planting time, it is necessary that the soil be in proper condition to pulverise readily.

Spring-ploughed land should be harrowed the same day it is ploughed.

Discing land in the spring before ploughing is a great advantage. It retains moisture and keeps the land longer in a good ploughing condition. It also pulverises the surface portion of the furrow-slice before it is turned under out of reach of the harrow.

When the soil is loose to a sufficient depth, corn roots penetrate in abundance to a depth of 3 or 4 ft.

The growing of clover and deep-rooted plants is profitably practised with most soils, and subsoiling is profitably practised with some soils to increase their water-absorbing capacity and to enable the corn roots to use the soil to greater depths.

By growing deep-rooted crops, or by some other means, the soil should be loosened to a great depth. As the crop on an acre is limited to 43,560 square feet of surface, it should be enabled to use the acre to a great depth. In compact soils ploughed but 6 in. deep and cultivated 3 in. deep there remains but 3 in. of loose, ploughed soil in which the corn roots can feed unmolested by summer cultivation, but if ploughed 10 in. deep and similarly cultivated there remains more than twice as much loose, unmolested soil for the corn roots.

There are good disc ploughs, there are good walking mouldboard ploughs, and there are good sulky mouldboard ploughs.

Poor ploughing can be done with a good plough.

Use large ploughs and plenty of power.

On many heavy clay soils the yield of corn per acre depends largely upon the thoroughness of the ploughing.

Loosen all the land and leave no large air spaces. Do not " cut and cover."

A pasture field was ploughed in alternate strips by two men, one a careful ploughman and the other a poor ploughman. The poorly ploughed strips showed poorer corn all through the summer and produced 20 bushels less corn to the acre than the well-ploughed strips. The careless ploughman allowed the plough to " cut and cover" in places, leaving hard spots where the plough did not loosen the land and large air spaces where the overturned sod buckled and did not come in contact with the subsoil. Hills of corn growing on hard spots or over large air spaces usually produce poorly.

Where a heavy growth of clover or weeds or a heavy application of manure was ploughed under in the fall, the land should be given, just previous to planting, a cultivation as deep as it was ploughed. This deep cultivation mixes the humus throughout the soil and is of more value than any other cultivation the corn crop can be given. It is economical, because wider cultivators and more horses can be employed than is possible after the corn is planted.

## PLANTING.

There are many questions concerning implements, methods, distance between rows, thickness of planting, &c., that should be definitely settled before planting time. These questions are governed to a large degree by local conditions.

A distance of 3·3 ft. between corn rows is suggested for the majority of cases. Some two-row planters are more easily adjusted to 3 ft. 4 in., which is very satisfactory.

More space is required for tall-growing than for smaller varieties.

It is never advisable to use seed that germinates poorly, and with first-class seed it is well to drop twice as many kernels as the number of stalks desired.

In planting, this familiar saying should be followed: "One for the blackbird, one for the crow, one for the cutworm, and three for to grow."

On poor land and also in very dry sections larger grain yields can be secured with a thin stand of stalks. Under such conditions, however, some other crop can usually be grown more profitably than corn, for corn requires much moisture and fertility.

In sections where the annual rainfall is less than 25 in. a thin stand of stalks is preferable unless moisture is supplied from some other source than rain.

Where soil moisture is likely to be deficient during the silking period, a stalk for each 20 in. of row (the rows being 3·3 ft. apart) is sufficient and will make possible a yield of 113 bushels per acre if the stalks average 1 lb. of grain each.

With an abundance of fertility and rainfall 12,000 or more stalks to the acre are necessary for obtaining record yields.

With an abundance of fertility and soil moisture throughout the silking period, a stalk for each 12 in. of row is advisable and will make possible a yield of 188 bushels per acre, the stalks averaging 1 lb. of grain each.

Drilled corn, if kept equally well cultivated and free from weeds, will usually produce better than hill-planted corn. The stalks develop better and yield better when separated from each other by several inches than when crowded closely together in hills.

If the acre is planted in hills by hand the kernels should be separated in each hill by several inches. This tends to increase the yield and makes it easier to thin without loosening or injuring the remaining stalks.

In the proper kind of seed-bed the kernels should be covered 1 in. deep. They should come in contact with moist soil. They cannot germinate in dry soil, and are liable to injury before rain occurs.

A successful planting, a satisfactory stand of plants, and a profitable yield are largely assured by getting the seed-bed in a perfect condition for very early planting and then waiting to plant until the soil is warm and moist.

The best possible yield necessitates the proper number of stalks evenly distributed. But this alone is not sufficient. Quality of stalks is as necessary as quantity of stalks. The proper number of stalks can be obtained by heavy planting of poor seed, but stalks from such seed will not produce well. The quality of a stalk is determined by the seed and the conditions for good production with which it is provided.

The secret of a prize-winning corn-crop consists in having the proper stand of stalks, each one of which yields well. This can be best accomplished by the heavy planting of good seed and thinning out the poorest plants.

Replanting seldom increases the grain yield.

Cultivating up the first planting and planting the entire acre the second time is better than replanting a poor stand.

## COMBATING CUTWORMS.

In many sections it is seldom possible to plant corn at the proper season without having a large percentage of the young plants destroyed by cutworms.

Fall ploughing and late spring planting are methods successfully used to combat cutworms.

A persevering boy can prevent his acre from being seriously injured by cutworms by placing upon each corn-hill, immediately after planting, and later on at intervals, lumps of poisoned bait, made by mixing about 50 lb. of wheat bran with 1 lb. of Paris green* and enough of the cheapest grade of molasses to make a stiff dough. Many of the worms eat this poisoned bait and die before the corn comes up, but this method of

* Paris green is a poison, and should not be placed where children or domestic animals can get it.

treatment has also proved quite effective even after the plants are well grown. Corn meal may be substituted for the wheat bran in the mixture when the latter is not available.

## THINNING.

For highly profitable crops, heavy planting and thinning are advisable, though not always practicable in extensive planting. It is one means a boy has of producing a record-breaking acre of corn.

Thinning should be performed as soon as the stalks are too hard for cutworms to cut off and before they are a foot tall.

A flattened broomstick or a similar stick to which is fastened a flattened piece of iron, like a 2-in. chisel, is of great assistance in thinning, as it is necessary to remove the stalks below the surface of the ground in order to prevent further growth.

Slightly more stalks than a perfect stand should be retained, so that injured, diseased, or feeble stalks can be removed later without reducing the stand below that required for the best grain yield. Such stalks should be considered as weeds and removed as soon as their inferiority is evident.

## CULTIVATION.

To produce a maximum yield, corn roots require warmth, a certain amount of air, and considerable moisture.

Corn is cultivated in order to supply these requirements.

Too much water and too little air in the soil as surely prevent healthy growth as too much air and too little water.

Air is deficient in saturated soils, and on such soils corn plants become yellow and unproductive.

Good cultivation at the proper time admits air, lessens the ascent of water from the subsoil, causes the soil to become warmer, and stimulates a better growth.

Weeds should be killed as soon as they begin to grow, but the primary reason for cultivating is to maintain the proper proportion of air and moisture in the soil.

Some successful corngrowers—some who have averaged 100 bushels of dry-shelled corn to the acre on hundreds of acres—believe the best single cultivation they can give their corn is a cultivation 8 or 10 in. deep given just before planting.

If prolonged and heavy rains pack the soil to a great depth, a deep cultivation can sometimes be given to advantage while the corn is less than a foot tall.

Soon after the plants become a foot tall their roots reach across the spaces between rows, and cultivation should not be deeper than 2 in. A deeper cultivation is likely to reduce the yield.

A shallow cultivation should be given as soon after every heavy rain as the land becomes in good workable condition. The cultivation should be given with such implements and in such a manner as to leave the soil in a fine, loose, smooth condition.

It is never safe to allow the soil surface to become hard and too dry to cultivate to the best advantage. Continued dry weather with the soil in this condition is certain to reduce the yield materially, and cultivating such soil results in still greater injury.

Until the silking period the soil surface should be kept in a fine, loose condition, so that in walking on it when dry it is felt to give under the feet and distinct footprints are made.

Shallow cultivations given even as late as silking time are often as valuable as earlier cultivations.

Weeds growing in the corn at silking time reduce yields very materially, as has been conclusively proved by experiments conducted by the Office of Corn Investigations.

Under some conditions six or eight cultivations are advisable, while under other conditions three cultivations may be sufficient to keep the soil in proper condition and would therefore prove more profitable than a greater number.

## SELECTING SEED FROM THE ACRE.

It is reasonable to assume that a variety that makes the best yields in a county is adapted to the locality. This is especially true if the same variety produces best for several years.

Well-preserved seed of such varieties is greatly needed and is in demand in practically all corngrowing counties.

It is also fair to assume that seed from a high-yielding acre, if well cared for during the winter, will under similar conditions give equally good yields on many other acres in the neighbourhood, and that with better care even greater yields may be obtained.

All good seed-ears should be gathered as soon as ripe and before any freezing has occurred.

Go through the acre with a picking bag on the shoulder and gather the ears from the best stalks. By walking between two corn-rows the good high-yielding plants in the two rows can be readily found.

The kind of plant from which seed should be taken is one that produces much better without any apparent reason than plants surrounding it. Plants with an unusual amount of space or an unusually fertile location may produce better than surrounding plants without possessing any greater inherent producing power, and therefore would be of no special value as plants from which to select seed.

In the Central and Southern States, where there is a tendency for stalks to grow too tall, short thick stalks producing pendant ears at or below their middle point are good stalks. From local varieties low-growing strains can be bred by selecting seed each year from high-yielding but low-growing stalks.

Where exceedingly early-maturing varieties are necessary, seed should be taken from stalks that produced their ears high enough to keep the ears from touching the ground when they become pendant.

Suckers are undesirable and can be gradually eliminated by taking seed only from stalks that produce no suckers.

In prolific varieties—*i.e.*, varieties bearing two or more ears per stalk—the various ears of a stalk are of equal value for seed.

When an unusually high-yielding and well-proportioned plant is found, the ear or ears should be cut with some of the husk attached, so that such ears can later be distinguished and used in planting the seed-acre the next year.

The seed-acre of one year must not supply the entire quantity of seed for the seed-acre the next year. A continuation of such a practice would tend to reduce the productivity of the variety because of close breeding.

To avoid close breeding, some ears from unusually good plants from other fields of the same variety should be planted each year in the seed-acre.

## DRYING AND CARING FOR SEED-CORN.

Immediately after gathering, the seed-ears should be placed to dry in a position where they will not touch each other and where there is a good circulation of air.

Binder twine or racks made from electrically welded wire fencing are satisfactory means of suspending seed-ears to dry.

In many Southern States it is not desirable to leave the ears on the racks all winter, as they are likely to be injured by the grain moth.

When the seed becomes as dry as old corn, it can be taken from the racks, weighed, and stored where neither moisture, moths, nor mice can injure it.

Upon care in this particular depends in a large measure the success of the next year's crop. Poor care has reduced and will reduce the yielding power of seed by 18 bushels per acre without perceptibly injuring its germination.

An upstairs room or an attic usually offers good protection from moisture.

A pound of naphthalene or moth balls stored with each bushel of seed-ears will protect it from grain moths and do it no injury.

Boxes or crates completely covered with fly screening or woven wire will give protection from mice and rats.

Perhaps no other regrets are so often heard at boys' corn-club meetings as those regarding the destruction of their seed-corn by mice and rats.

If seed-corn be placed where it is merely supposed that mice or rats cannot injure it, the owner is likely to meet disappointment.

There are so many unavoidable things that may cause poor yields that it becomes necessary to insure success in every way possible. The only way to insure the seed supply is to place it where it cannot be injured by anything.

## DETERMINING THE YIELD.

A record of a big yield to be of value must be honestly and accurately determined according to standard methods of measurement.

It is easy to weigh the corn when it is full of water and to measure a smaller area than that which produced the crop, but to do so makes the weighing and measuring a mockery and the record of no value.

Green, sappy ears may weigh twice as much as when dry.

A plat consisting of four corn-rows 4,400 ft. long and 3·3 ft. apart occupies 1 acre if measured from one outside row to the other, but by correct measurement it occupies 1⅓ acre of land.

The number of rows must be multiplied by the average width between rows and this product multiplied by the full length of the plat to obtain the true area from which the corn received benefit.

To make the records of value and have them comparable from year to year it is necessary to consider the moisture in the corn when harvested and weighed. To accomplish this, 100 lb. of ears should be weighed when harvested, put in an airy place till as dry as old corn, and then weighed again and shelled. The weight of shelled corn is the percentage of dry-shelled corn, and multiplying the total pounds harvested by this percentage gives the yield in pounds of dry-shelled corn.

If the acre was harvested directly after the seed was selected, the harvest weights of all can be reduced to pounds of dry-shelled grain by the one calculation. But if the seed was selected while in a sappier condition, a similar process is necessary to determine the pounds of dry-shelled grain taken from the acre for seed.

## CONCLUSION.

The praiseworthy and highly beneficial co-operative corn-improvement work in progress throughout the United States is making it more urgent that records be kept and that they be kept in definite and comparable terms.

Dry-shelled corn per acre is the most definite and generally accepted way of recording corn yields. Old corn, or corn containing approximately 12 per cent. of moisture, is considered dry corn. Fifty-six pounds of shelled corn constitute a bushel.

True records will point the way to further improvement. Knowledge of the requirements of the corn-plant and of the best practicable means of supplying such requirements is of great and general value to the people of the United States. Our weakest defence is our vast acreage of poor corn, the culture of which is impoverishing farms and farmers.

The possibility of doubling the acre yield of corn has been demonstrated in many and remote sections of the United States. A persistent loyal adherence of all corn-improvement workers to the motto "Fewer acres and more corn to the acre" is certain to gradually raise the average yield of county, State, and nation.

## OBSERVATIONS OF A TEXAN ON QUEENSLAND.

Many of our readers will remember that in May last an American cotton-grower and ginnery owner from Texas, U.S.A., Mr. E. E. Wood, came to Queensland with the object of ascertaining the capabilities of the State as a stock-raising country, and particularly as a field for the cotton-growing industry. Mr. Wood, during his stay, visited much of the Western country as far as Dulacca, the Southern border at Texas, Inglewood, and Goondiwindi, and the Central districts as far as Barcaldine. He was so impressed with the magnificent opportunities afforded in these districts for the profitable investment in many industries that he announced his intention of returning within the year to settle here, and to bring several of his compatriots with him. Since his return to Texas he has missed no opportunity of advertising our State both by word of mouth and by articles in the Texan Press. The following appeared in the "Childress Post," Texas, of 15th July. There are a few inaccuracies of little moment, such as, for instance, the eucalyptus shedding its leaves, and not its bark, and the absence of improved farming machinery amongst the farmers:—

"After visiting three days in Sydney I took the train to Brisbane, and I could not have been better treated at home than by the Queenslanders. This is a stock-farming State, with the farming left out. Horses, dairy cattle, stock, cattle, and sheep were rolling fat on the natural grasses.

"In but few places of 2,000 miles travelled did I see enough real farming to supply what ought to be produced at home, relying in most places on the natural grasses—the Darling Downs and Lockyer district being exceptions to the rule. There we saw bread meadows of alfalfa, wheatfields, and small patches of corn, sorghum, and millet. Dairying is a growing industry, and here they outshine us by co-operatively owning creameries, bacon factories, mercantile establishments, &c., which is lately encouraged by the Government.

"After mining and stock-raising, dairying is the next most important industry, and they certainly know how to handle it to get the most out of it. The co-operative factories have co-operative selling agencies in London; also in San Francisco. Upon the opening of the Panama Canal they intend to invade the Mississippi Valley and the Atlantic coast with their butter, which is marketed with less cost between the producer and consumer than is known in this country. The dairyman gets from 18 cents to 22 cents per lb. for cream and return of profits out of the creamery.

"Wheat-raising is very successful, the land being broken, sown, and harvested in an up-to-date manner; but the marketing of the crop is crude, being handled in bushel jute bags on the cars and off and on the ship by hand labour. There is not an elevator in the entire country.

" Most Americans who have gone to Australia have made good, a number of whom are directing heads of large concerns—mines, factories, packeries, and railways. Australia being an undeveloped country calls for the push and enterprise that has put this country to the front, and the Government is now offering special inducements to Yankee farmers

to go there. Australian labour is the best paid of any in the world, and the per capita wealth is the greatest.

"Wool is to that country just what cotton is to this, over 100,000,000 dollars being the annual return of the wool clip. This is handled, packed, and marketed in a superior manner to the way we do it.

"Fat cattle for market is a large and growing industry. Shorthorns is the favourite breed. I saw several bunches of steers that would dress 700 to 1,000 lb. Such a thing as topping off cattle for market has not occurred to them.

"Fly-screens are noticeable by their absence, and cornbread and buttermilk are good for pigs only.

"The Australian worker is ultra-conservative. His time-honoured way is right, and if you want it done any other way he will quit.

"This is a land of good solid fences without a fence staple. All posts are bored, and the wire drawn through the holes. Nails are not extravagantly used, most carpenter's work being mortised and tenoned. The eucalyptus family of trees (of which there are many varieties) is the prevailing timber. Nearly all kinds are hard and durable. The presence of the eucalyptus accounts for the absence of malaria; it sheds its leaves, but not its bark. The healthfulness of the country is equal to West Texas. Two-wheeled carts and carriages are the prevailing type of vehicles.

"The cultivation of row-crops is a big undertaking for an Australian farmer, 20 acres being thought a big job for one man. Improved planters and cultivators of the American type are scarce. Corn is successfully raised in most districts, considering the tools they have to work with. Sugar-cane is a large industry in the Central district. Cotton-growing is not extensively engaged in, though it thrives and grows perennially in all parts of Queensland. The planting, cultivating, and gathering of cotton is not grasped by them, though they have the ambition of becoming one of the large cotton countries of the world, all of which they can be by proper effort. All kinds of fruits and flowering shrubs grow to perfection. Citrus fruits are especially adapted to this country. Their skinned fruits are subject to injury by a fruit-fly.

"Queensland boasts of the richest gold mine in the world, this being Mount Morgan, which has returned 40,000,000 dollars in dividends. An American is manager. There are many other mines of copper, gold, tungsten, and coal and other minerals. Precious gems of different varieties are found also.

"Rabbits, descendants of three pairs of Kentucky cotton-tails, are a great pest to the Southern part of the continent, and are prevented from spreading over the whole area by a rabbit-proof fence, and guards are kept to see that none get through. The prickly pear is also an imported pest that is fast spreading over the land, and there seems no remedy but by settling up the land. It has a liking for the richest lands, and these lands can be acquired from the Government at a low price, the

main consideration being to rid the land of the pear in a given time. In some places a bounty is paid.

"Living expenses are not as high there as here, but building material and machinery are 20 to 40 per cent. higher.

"Queensland schoolhouses in the country are superior to the average Texas rural schoolhouse, and from a casual inspection we would say that their rural schools are better than ours. The town and city schools are not up to the latest practice with us, and their school literature is not written in as attractive a style as ours. Queensland State University has been established two years, and is the only institution in the State of higher education. There are numerous high schools and agricultural schools. Schools are maintained out of the general revenue of the State, and not by local tax levy, as with us.

"Public utilities, with few exceptions, are operated by the State, and their telephones, telegraph system, and railroads appear to be more satisfactory than ours, and telegraph rates are one-half the rates here.

"Nearly all the latest ideas in government are being worked out in Australia. Old age pensions, mothers' bounties, minimum wage and eight-hour day, Government aid to buy homes and farms, advances to farmers at 5 per cent. to improve or equip farms, with twenty years to repay, being some of the ideas they are trying out. The latest idea agitated for adoption is to make all railroads absolutely free of charge, and support them out of revenues from the State, thereby putting all parts of the State on an equal footing with its products.

"The invasion of the country by the American Meat Trust is causing quite a stir among the consumers. Stockmen are well satisfied, as cattle have advanced nearly 10 dollars per head since the coming of the trust.

"Americans have invested about 2,000,000 dollars in the only up-to-date packing-house on the continent, and have also invested largely in ranch properties.

"Australians feel the kinship of Great Britain strong, but his brother Yankee more nearly represents the ideals for which they are striving, and the friendship is growing stronger as time goes on.

"Wild animals native to Australia are principally of the marsupial family, some of which are the kangaroo, wallaby, wombat, and opossum. The animals are not vicious, all animals appearing to be tamer than they are here. Wild ducks, geese, turkeys, cockatoos, and emus are some of their birds. There are said to be a good many snakes, but we did not see any.

"The Australian can be depended upon to describe his country to an American in a way that would lead one to believe it was 'not too bad' or 'could be worse.' They are very conservative in all their statements.

"The Queensland 'desert' is a slope of country about 100 miles wide, with open timber on it, and is covered with grass from 1 to 3 ft. high, and underlaid with water from 15 to 100 ft. in depth."

## WHAT KIND OF MANURE SHOULD I USE?

By J. C. BRÜNNICH, Agricultural Chemist.

A good many years ago, in an early number of this Journal, I wrote a short article on the same question. Since that time the inquiries, made by farmers with regard to the application of fertilisers, are becoming more frequent, as the fact becomes apparent to the observant agriculturist that both quantity and quality of crops in many instances, particularly on old lands, show a distinct falling off.

The question, *"What kind of manure should I use?"* is generally followed by the question: *"Has manure to be applied every year?"*

A short consideration of the fact, that large amounts of plant-foods are removed by crops from the soil every season, makes it quite clear that the small amount of fertiliser, applied with the crop, is completely used up, and has to be made up again in one form or another for every succeeding crop.

No one can have a conception of the value of the **constituents removed from the soil,** unless by going into figures. A short calculation based on last year's crops, as given by the Government Statistician, will be of general interest, and throw some light on this matter. In the following calculation only such fertilising constituents actually removed in the grain, tubers, and crushable sugar-cane are taken into calculation, and far larger amounts are really contained in straw, stubble, cane tops, and may largely be lost by unsuitable methods of treatment.

| | Removed Tons of— | | |
|---|---|---|---|
| 1913 Crop. | Potash. | Phosphoric Acid. | Nitrogen. |
| 1,769,432 bushels Wheat .. | 264 | 448 | 1,145 |
| 3,915,376 ,, Maize .. | 420 | 900 | 1,990 |
| 115,975 ,, Barley .. | 26 | 16 | 52 |
| 16,548 tons Potatoes .. | 20 | 76 | 53 |
| 2,085,600 ,, Sugar Cane .. | 2,235 | 1,180 | 1,210 |
| Total .. .. | 2,965 | 2,620 | 4,450 |
| corresponding to tons .. | 5,700 | 14,550 | 37,000 |
| | Sulphate of Potash. | Superphosphate. | Dried Blood. |
| of a market value of .. | £80,000 | 72,750 | 333,000 |

We learn that in this manner last year constituents to the value of nearly £500,000 were taken away from the soil.

The actual quantities of artificial fertilisers used in Queensland can unfortunately not be ascertained, but will no doubt represent only a very small fraction of the required amounts. The only figures available refer to oversea export and import, and disclose the extraordinary fact, that with all the great need for artificial fertilisers, last year 2,756 tons of fertilisers (chiefly meatworks manure, dried blood, &c.), at a value of £15,686, were exported, and only 394 tons of fertiliser, of a value of £4,835, were imported.

It is therefore quite evident that most of our farmers are drawing largely on the capital value of their land, which must lead to gradual deterioration and final abandonment of their holding, and is based on the economically unsound reason frequently put forward: "*Why should*

*I fertilise, when I can get virgin land at a less value than the cost of fertiliser, recommended to be applied per acre?"*

The general adoption of a system of cultivation, based on such an argument, would be disastrous to the State. In the United States of America a similar policy, which had been practised in a few localities, is the cause that some millions of acres of originally high-class agricultural lands have become practically sterile, whereas in European countries, although the soil has been under cultivation for hundreds of years, with proper treatment and fertilising the fertility of the soil has not only been maintained, but the yield of crops has actually been steadily increased, in some cases nearly doubled.

The gospel of **thorough cultivation** combined with the **use of fertilisers** is preached by every officer of the Agricultural Department, and is making slow but sure progress. In a great many instances most gratifying results have been obtained by farmers who have followed our advice, and such farms are always a valuable object lesson to the whole neighbourhood.

In cane cultivation a fairly large amount of artificial fertilisers are used, and generally **complete fertilisers,** or such fertilisers containing the most suitable proportion of fertilising constituents—phosphoric acid, potash, and nitrogen—are applied.

In fruit culture artificial fertilisers are also being used, but in this case as in other general farming the inclination of the majority of farmers is to use incomplete manures, like bonedust, meatworks manure, &c.

In the choice of suitable fertilisers the farmer must bear in mind the fundamental principle of **soil fertility,** that it is not the large or abundant amount of any particular constituent in the soil which regulates the crop, but that the crop depends more entirely on the **minimum available amount** of any essential plant-food, everything else being favourable. It is not only necessary that all plant-foods are present, but they must be found in certain proportions to give **optimum results** with crops, and if one single constituent is absent, or present in too small a quantity, or in unavailable form, the crop must suffer. The excess of any constituent again may give bad results, and even lead to complete sterility of the soil, but as a rule such excesses are found but rarely, and are rarely to be feared.

In the majority of cases a **soil analysis** will be of value to ascertain the manurial requirement, but we have cases on record where analysis failed to give explanation of the failure of the crop. There are numerous factors, besides the nutrient chemical constituents, which influence the fertility of a soil, like its physical condition, on which chiefly the access of air and moisture depends, its bacterial flora and others.

It is easily understood that fertilisers alone will not ensure success unless other conditions are also favourable, and therefore thorough cultivation must go hand in hand with the application of manures.

There can be but little doubt that **moisture** is one of the most important factors on which the growth of crops depends, and the conser-

vation of moisture in the soil is largely in the hands of the farmer. **Cultivation** again has frequently to be modified according to seasons, and only that farmer will succeed who keeps careful note of observations made during his farming experiences and applying the conclusions drawn from such observations to the future treatment of his land.

With regard to the **kind of manure** to be applied for various crops, the pamphlet "Complete Fertilisers for Farm and Orchard," which is obtainable from the Department of Agriculture and Stock, gives full information with regard to kind and quantity to be applied to crops grown on soil of average fertility. It is quite possible and probable that a modification of the amounts may give better results, and it is quite within the means of any farmer to make a few **simple experiments** to ascertain the most profitable mixture for his soil.

One of the causes of failure in the use of artificial fertilisers is often the **want of lime** in soils, and there again simple experiments will be of much greater value than any amount of theoretical advice.

The experiments themselves can be carried on on a very small scale, taking a row or even only a few plants for each experiment. **Simple manures** of constant composition, like sulphate of ammonia, dried blood, nitrate of lime, may be used as the source for nitrogen; sulphate of potash to supply potash, and superphosphate, or Thomas phosphate to supply phosphoric acid.

By making **plots,** which receive no manure or only **incomplete manures**, the requirements of the crop for anyone of the essential plant-foods will become apparent. Again, one plot which receives a **complete fertiliser** should be treated with lime in addition to ascertain if lime is required or not.

**Lime** is one of the other most important factors in soil fertility, and many of our coastal soils are rather deficient in lime, as unfortunately lime is one of the constituents most readily leached out by rain. I cannot refrain from quoting from an address given by Mr. A. D. Hall, the late director of the celebrated Rothhamsted Experiment Station, as president of the agricultural section of the British Association for the Advancement of Science, at a meeting in Adelaide:—

"Of all the soil factors making for fertility, I should put lime the first; upon its presence depend both the processes which produce available plant-food in quantities adequate for crop production at a high level; and those which naturally regenerate and maintain the resources of the soil; it is, moreover, the factor which is most easily under the control of the agriculturist."

The following **series of experiments** would have to be carried out:—

1. No manure.
2. Potash and phosphoric acid (incomplete without nitrogen).
3. Potash and nitrogen (incomplete without phosphoric acid).
4. Phosphoric acid and nitrogen (incomplete without potash).
5. Potash, nitrogen, and phosphoric acid (complete manure).
6. Potash, nitrogen, and phosphoric acid and lime.

Now, comparing the results of the returns from the six plots, the following observations could be made:—

If results from 2, 3, and 4 are equally poor, but 5 gives good results, and 6 even better returns, the soil is deficient in all plant-foods. Should 6 give but a slight increase over 5 no liming would appear necessary. Should 2 give a very poor yield, whereas 3 and 4 give fair returns, particular want of nitrogen would be indicated. Again, should 2 and 3 give poor results, but a fair return from 4, the soil requires chiefly phosphoric acid and nitrogen, but contains a sufficient amount of potash, and in fairly available form.

As soon as such experiments have been repeated during a few seasons and with various crops, the particular **requirements of the soil** would be known once for all, and the experiments could be continued to ascertain **other forms** of **artificial fertilisers** to replace those originally used. It may be found that, for instance, nitrate of lime would give better results than dried blood or sulphate of ammonia. On red volcanic soils it is very probable that Thomas phosphate would do better than superphosphate, because the water soluble from of phosphoric acid contained in the latter is rapidly changed into practically insoluble form, whereas the phosphoric acid in Thomas phosphate remains unaltered in a form readily soluble in dilute acid solutions (citrate soluble phosphoric acid).

When making such manuring experiments the farmer is advised to make his own mixtures, and in the choice of fertilisers the following points have to be born in mind:—

**Nitrogenous Manures.**—The plants utilise nitrogen most readily in form of nitrates, and for this reason nitrate of lime (13 per cent. of nitrogen) and nitrate of soda (15 per cent. of nitrate) are quick acting manures, and therefore often used as top dressing. The nitrogen in the form of ammonia salts, ammonium sulphate (with 20 per cent. nitrogen) is charged in the ground first into nitrates before it becomes available. The nitrogen in dried blood (9 to 12 per cent. nitrogen) and in nitrolim or cyanamide (18 per cent. nitrogen) has also to undergo various changes before being available to plant life.

**Phosphatic manures** are divided into three classes, with regard to the solubility of the phosphoric acid they contain:—

1st. Readily soluble or water soluble form in superphosphate (containing 16 to 18 per cent. phosphoric acid).

2nd. Fairly soluble or citrate soluble form in Thomas phosphate or basic slag (from 17 to 18 per cent. phosphoric acid).

3rd. Insoluble form in bonemeal (with 18 to 22 per cent. phosphoric acid), rock phosphates, &c.

Bonemeal has to be applied in finely crushed form to be of value, and its success is often due to the small amount of nitrogen it contains, but the phosphoric acid in it is extremely slowly available and may remain in the ground for years.

**Potash** is nearly always supplied in form of sulphate of potash (50 to 52 per cent. potash), and the use of muriate of potash (58 per cent. potash) and kainit (12 per cent. of potash) is as a rule not advisable.

**Experiments** with **soil treatment** under different methods of cultivation must not be neglected, and particularly the value of mulching the ground with green crops, or even bush hay and weeds, should be ascertained. The increase of **humus** in the soil must be encouraged, and for this purpose **green crops** should be more generally utilised; in many cases it would pay to manure such green crops and even weeds for this purpose.

# MARKET GARDENING.

## TRANSPLANTING VEGETABLE SEEDLINGS.

For transplanting, the ground should be prepared, more especially for delicate plants, in precisely the same way as for seed-sowing. The finer the surface soil is, the more easily will the young tender rootlets be able to force their way down in search of food and sustenance; and as a consequence, leaf growth will necessarily follow.

If the soil is hard and lumpy, the attempt of the rootlets to strike into it becomes to some extent useless, and it naturally follows that the top growth also becomes retarded, and it will only be by good luck if the plants come to anything. When taking the plants from the seed-bed, be careful not to break the roots too much, and endeavour to lift them with a little of the soil adhering. Never pull young plants up, but lift them carefully. It is a good plan to give the bed a thorough soaking with water some time before beginning to lift the plants.

Always, if possible, choose a dull or showery day for transplanting, but, should the weather be warm and dry, do the work in the afternoon, and water well after planting; and if suitable material is procurable, mulch the ground for a few inches round each plant. Set the plants a little deeper in the ground than they were in the bed, and firm the soil well around the roots without bruising the necks of the plants.

Take care always to make the hole for planting just deep enough, so that the plant will not hang in it, and give the plants plenty of room to grow, by setting them a little wider in the rows than the size of the plants when fully grown.

For example, if a cabbage will cover $2\frac{1}{2}$ ft. on the outside leaves, set the young plants of that variety out 3 ft. apart each way.

Should the weather be dry for some time after planting, it will be necessary to water the young plants several times a week until they become established; the watering being done either early in the morning or late in the afternoon.

A great deal of watering and hoeing will, however, be saved if *mulch* is used. The importance of mulching cannot be over-

estimated. Almost anything will do—stable manure, grass, or litter of any kind, provided it can be easily and conveniently placed around the plants. Mulching prevents the ground from baking after watering, and so saves hoeing; and it also helps to arrest evaporation, thus saving watering; and also it tends to keep the temperature of the surface soil equable, and so tends to promote healthy and vigorous root-action. I confidently recommend mulching for any kind of vegetable crops which require transplanting, and am sure that the grower who tries it once will never give it up again so long as he aims to get the best possible results from his work with as little labour as possible.

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## BEANS.

There is a considerable variety of beans for gardening purposes. These comprise French or kidney beans, including the stringless Butter Beans, Canadian Wonder, Pole Beans, Scarlet Runners, Broad Beans, and Lima Beans. All these are annuals except Lima beans, which are perennials in districts where there is no severe winter cold. French beans may be grown all the year round in many parts of Queensland, but where frosts prevail the season may be reckoned from the middle or end of August until April or May. During these months, successive sowings may be made at intervals of two or three weeks when the ground is not too dry. Any good garden soil with grow French beans, but the best crops are obtained from good loams or alluvial soils. The drills should be a few inches deep, varying from 2 to 4 in., according to the weather and the state of the soil. Make the rows 3 ft. apart, and put the seed at least 6 in. apart in the rows.

Should the soil be very dry, water it well before sowing. The beans should be gathered as they become fit—that is, while young and tender; and unless it is desired to save some for seed they should not be allowed to ripen, as thereby the bearing powers of the plants will be considerably lessened.

Pole or runner beans are summer plants, and may be sown from September to February or March. The rows for these should be 4 or 5 ft. apart, and, before planting, poles about 6 ft. long should be set up along the rows at a distance of 3 or 4 ft. apart. Around each pole plant 6 or 8 seeds, 2 in. deep, and when they come up thin them out, leaving four of the strongest plants to each pole. It may sometimes become necessary to tie the young tendrils to the poles at first, but as soon as they begin to run they will twine around the sticks naturally without any artificial help. Broad beans do not succeed well in the hot weather, their season being from March to September. Sow in drills 3 or 4 ft. apart, 3 in. or so deep, and the beans about 9 in. apart in the rows. When the plants come into flower, their tops should be pinched off in order to check the upward growth and cause the beans to set. If this pinching is neglected, in all probability the plants will continue to grow, most of

the flowers will drop off, and there will be little or no crop. The beans should be gathered as they become fit whether they are wanted or not, so as to prolong the bearing season as much as possible.

Lima beans are a good crop to grow in the summer months, as they will stand any amount of heat and dry weather, and continue in bearing for a very long time. The dwarf or bush limas are perhaps the best to grow, as they require no poles, and consequently give less trouble. Lima beans may be planted in August or September, and again in November, and will continue to grow and bear until cut down by the frosts of winter. Dwarf limas may be planted in drills 3 ft. apart, and the seeds 18 in. apart in the rows or in hills of four or five seeds 3 ft. apart each way. The seeds should not be planted more than 2 in. deep, and should be placed in the ground edgeways, with the eyes down.

The pole limas require the same treatment precisely as other pole beans. French beans and most of the pole beans are *pod* beans, of which the edible part is the young and tender seed pod. Broad and lima beans, on the other hand, are *shell* beans, the part used for food being the bean itself and not the pod.

All of these, except the lima, must be used when young and tender. The lima bean may be used green (the bean itself, not the pod) or allowed to ripen, and stored for winter use. They will keep for a long time, and only require soaking in water before cooking to render them soft and palatable. They are the most delicious of the pod beans. Lima beans should be more extensively cultivated than they are, because they will succeed in dry seasons when other beans fail, and continue to bear right through the summer.

The varieties of French beans, including butter beans, are very numerous, and each grower must choose what best suits his requirements.

Of the limas, the largest and most delicately flavoured are Burpee's bush lima.

A good manure for beans is a light dressing of farmyard manure, 4 to 6 cwt. of superphosphate, and 1 cwt. of sulphate of potash (or 4 cwt. of kainit) per acre. The use of 2 cwt. of nitrate of soda per acre gives a very substantial increase of crop. An acre so treated has given an increase of nearly 50 per cent. Where 3¼ tons of French beans were obtained from an acre on which no nitrate of soda was used, 4½ tons were gathered on the same area as the result of its use.

Of late years much loss has been sustained by French bean growers owing to the destruction caused by the Bean Fly. On this subject, Mr. E. Jarvis, Assistant Government Entomologist, says:—

"Attemps to cultivate French beans in Southern Queensland are apt to prove more or less unsuccessful, and in some districts it is almost impossible to grow this vegetable during the summer months. A crop may look promising at the start, but before long the young plants may

show unmistakable signs of arrested growth, and become wilted and sickly looking, droop gradually, and at last topple over one after another in a most disheartening fashion.

"In the absence of any decided external evidence of injury, the grower is naturally somewhat at a loss to account for the cause of such failure, and is usually too disgusted to closely investigate the matter. In such cases, however, neglect is never advisable; and specimens of the affected plants, with particulars as to time of sowing and first notice of attack, &c., should be sent without delay to the Under Secretary of the Agricultural Department.

"The above symptoms are not due to climatic changes, or to the presence of fungi, but to the ravages of a small fly, the grubs of which tunnel in the stems and can easily be found if the skin of a badly-attacked bean-stalk be carefully peeled in places with a sharp pocket knife. Such treatment will disclose a number of tiny pale-yellow maggots, about one-eighth of an inch long, lying close to the surface; and careful scrutiny will reveal the presence of still smaller, reddish, seed-like bodies, immediately under the dried skin, which are the pupæ from which these destructive insects will ultimately issue."

The remedies he suggests are:—

1. Grow a small catch-crop of Canadian Wonder beans very early in the season to meet the first brood of flies, and when these plants are found, upon examination, to be harbouring good-sized grubs, pull them up and burn them without delay.

2. Root up and burn all old bean plants immediately they have ceased to become profitable.

This and the preceding method of control are of the greatest importance, and will well repay growers for any trouble or loss of time incurred.

3. Protect the stems by hilling them up with soil until covered. (Mr. Froggatt says that Sydney market gardeners adopt this plan, which in good growing weather enables a damaged plant to root afresh above the injured portion.)

4. Mr. Tryon reports that the best results have been derived from growing the beans in a shallow trench and applying to the soil (so as not to touch the plants) whitewash made from acetylene refuse, or lime slaked with water, containing carbolic acid or phenyle. Some benefit, he tells us, has been derived from "turning some of the soil back, and either painting the stalks with simple whitewash, to which a little glue has been added to promote adhesion, or sprinkling lime around them."

On small areas, for example, it might be worth while to try—as an experiment—stretching three or four lengths of coarse packing-twine over a row of dwarf beans close to the upper leaves, having first dipped the string in some attractive sticky solution. A few sticks stuck in the ground at intervals would afford all the support needed, and the device, being simple and inexpensive, would, I think, be worth trying.

# Pastoral.

## PEAS FOR FATTENING SHEEP.

It has remained for the island State of Tasmania to provide the material that goes to show that this branch of rural operations has something out of the ordinary to recommend its more general adoption. In Tasmania peas yield prolifically, so there is every advantage to be gained by farmers using this fodder. Fat lamb raising is a very profitable branch of farming, especially on small holdings and in country where settlers have great difficulty in getting their produce to market. It is an industry which offers considerable scope for expansion, and farmers might do well to test pea-feeding to lambs and sheep. Trials conducted on the north-west coast of Tasmania show that when peas become low in price, it pays better to harvest them by means of the stock than to thrash them. With the labour troubles that are now besieging the farming industry this policy of having the produce "Walk off the farm" is one that merits serious consideration. The experiments referred to were conducted by Mr. W. Henry, at Gunn's Plains. He had a fairly large area sown to peas, and as the market promised nothing better than 3s. 6d. per bushel for machine-thrashed delivered at the nearest port, he was induced to experiment on a paddock of 11 acres to ascertain whether it would not be more profitable to feed off with lambs than to harvest them in the usual way. It was estimated that the crop (a light one for the district) would yield 30 bushels to the acre if harvested in the usual manner, under modern methods, and machine-thrashed. The cost of carrying out these operations in a favourable year, including bags and carting, would run into fully £2 10s. per acre. This is necessarily in this instance merely an estimate, but the figures can be readily checked by experienced, practical men, and will be found substantially correct. Thus the net return per acre would be £2 15s., made up as follows:—

| | £ | s. | d. |
|---|---|---|---|
| 30 bushels machine-thrashed blue peas, at 3s. 6d. .. | 5 | 5 | 0 |
| Less cost of marketing .. .. .. .. .. | 2 | 10 | 0 |
| | £2 | 15 | 0 |

or a net return from the 11 acres of £30 5s.

The paddock was divided by netting into two lots, and 254 shorn lambs, consisting of about 25 per cent. fats and the balance forward and medium stores, valued for this particular purpose at 13s. per head, were placed on one lot at the end of January. When it was eaten out the whole area was thrown open, the peas, of course, being ripe. With the exception of about ten days, when they were taken off to clear up some pea stubble, the lambs had nothing but what these 11 acres supplied till 30th

March, when they were taken off and sold on 2nd April. The result was as follows:—

| | £ | s. | d. |
|---|---|---|---|
| Net return of 253 lambs (one dead) .. .. | 208 | 18 | 5 |
| Value of lambs when placed on peas, *i.e.*, 254, at 13s. | 165 | 2 | 0 |
| Net profit .. .. .. .. .. .. | £43 | 16 | 5 |

This shows a profit in favour of the sheep of £13 1s. 5d., or £1 4s. 8d. per acre, independent of any consideration for the undoubted enrichment of the land which might fairly be credited to the sheep or allowed as a set-off for the benefit the lambs derived from the pea stubble during the ten days referred to. It was found that the sheep cleaned up every pea not trampled into the ground. The only possible risk to be run, in Mr. Henry's opinion, is the chance of a wet season, when there might be some waste owing to the peas shooting—a matter that would cut both ways, as the peas, if harvested, would cost so much more in a wet season. He is quite satisfied that with peas at anything under 4s. 6d. per bushel, it is more profitable to feed off with lambs.—" Pastoral Review."

## CATTLE IN AUSTRALIA.

In reply to a correspondent, "Town and Country" (Sydney) says: —"In all of the States of the Commonwealth cattle-raising is carried out on a more or less extensive scale, the main object in certain districts being the production of stock suitable for slaughtering purposes, and in others the raising of profitable dairy herds. The great impetus which the development of the export trade in Australian butter gave to the dairying industry in the Commonwealth led to a considerable increase in the numbers and quality of the dairy herds of the States of Victoria, New South Wales, and Southern Queensland in particular, the sub-tropical portion of Australia being apparently the best adapted to this industry. On the other hand, by far the finest specimens of beef-producing cattle are those raised in the tropical districts of the Commonwealth—*i.e.*, in the northern part of Queensland, in the Northern Territory, and in the Kimberley districts in the north of West Australia. Until 1880 New South Wales occupied the leading position in the Commonwealth group as a cattle-raising State, but in that year Queensland forged ahead, and obtained a lead which it has since maintained. The extent of this lead has, however, varied considerably, owing principally to the effects produced by the tick-fever and droughts, from both of which causes the Queensland herds suffered more severely than those of the other States. In fact, during the period from 1894, the number of cattle in Queensland attained the maximum of rather more than 7,000,000 to 1903, when the number recorded was less than 2,500,000, an uninterrupted decline was experienced. During the nine years, ended 1912, however, a rapid improvement took place, and the total reached on 31st December, 1912, more than 5,200,000."

# Dairying.

## THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF AUGUST, 1914.

| Name of Cow. | Breed. | Date of Calving. | Total Milk. | Test. | Commercial Butter. | Remarks. |
|---|---|---|---|---|---|---|
| | | | Lb. | % | Lb. | |
| Nellie II. ... | Shorthorn... ... | 20 July, 1914 | 911 | 3·8 | 40·54 | |
| Auntie ... | Ayrshire ... .. | 26 June ,, | 851 | 3·7 | 36·88 | |
| Lark ... | ,, ... .. | 27 July ,, | 777 | 4·0 | 36·40 | |
| Bee ... ... | Jersey ... . | 3 July ,, | 682 | 4·5 | 36·14 | |
| Lady Margaret | Ayrshire ... ... | 19 June ,, | 825 | 3·6 | 34·77 | |
| Miss Edition | Jersey ... .. | 10 July ,, | 625 | 5·5 | 34·62 | |
| Bluebelle ... | ,, ... . | 27 May ,, | 666 | 4·4 | 34·49 | |
| Burton's Lady | Shorthorn... ... | 23 July ,, | 795 | 3·6 | 33·47 | |
| Sweet Meadows | Jersey ... .. | 28 July ,, | 573 | 4·8 | 32·42 | |
| Countess of Brunswick | Shorthorn... .. | 26 July ,, | 793 | 3·4 | 31·53 | |
| Davidina ... | Ayrshire ... .. | 17 July ,, | 699 | 3·6 | 29·46 | |
| Miss Bell ... | Jersey ... .. | 25 Sept., 1913 | 424 | 5·4 | 27·04 | |
| Lady Athol | Shorthorn... .. | 10 July, 1914 | 677 | 3·4 | 26·89 | |
| Lady May ... | Ayrshire ... . | 4 May ,, | 587 | 3·7 | 25·41 | |
| Lady Melba | Holstein ... .. | 6 Mar. ,, | 583 | 3·5 | 23·84 | |
| Cocoatina ... | Jersey ... . | 20 April ,, | 383 | 5·2 | 23·51 | |
| Nina ... | Shorthorn... .. | 5 April ,, | 542 | 3·6 | 22·81 | |
| Miss Melba | Holstein ... .. | 10 July ,, | 450 | 4·2 | 22·20 | |

## PIG-RAISING IN AUSTRALIA.

The following addresses were recently delivered by Mr. P. H. Suter, Dairy Expert, of South Australia:—

The serious attention given to pig-raising in older countries had not been accorded this branch of industry in Australia, he said. Here there was no animal contributing so much directly to our food supply, nor was there any so badly housed. Indeed, in many places the pig had been looked upon as a scavenger, and only too often treated as the housewife's best sink. We had in this State some excellent animals, the fruits of money spent by breeders, who imported pigs at considerable cost; but there was room for improvement generally, not alone in the type of pig, but in the general management thereof, particularly in housing and feeding. To many, he said, a pig was just a pig, although it cost no more to keep a good one than a bad one. The remarkable fact about improved pigs was the readiness with which they fattened, and the shorter time they took to reach that stage demanded by the butcher. An illustration was given to show the difference in profits that might be

expected from a good sow mated with a well-bred boar and a bad sow mated with an ill-favoured boar, assuming that each produced two litters in one year, thus—A good sow produced 20 bacon pigs, valued at £3 10s. per head, or £70; and feeding expenses, including £5 for keep of sow and £35 for the feeding of progeny, left a profit of £30. The inferior sow produced 12 young pigs, worth £3 7s. 6d. per head, or £40 10s.; and with £5 for maintenance of the dam and £21 for the feeding of the young ones the net profit was £14 10s.

The instability of market was frequently blamed for the erratic interest taken in the subject. This might result from over-production, but more often was due in this State to the fact that heavy supplies were obtainable in the Eastern States. It was also quite possible that prices obtainable were not so profitable when the price of foods, such as barley, peas, &c., were at high levels, or that pigs were marketed when either too light or too old and weighty for trade requirements.

The industry would continue to have its ups and downs just so long as we had no outside market. The only way to secure a sure and permanent market for pigs was through the systematic development of a few bacon and ham factories, not in the city, but in suitable country districts, where conditions were favourable for economical and proper feeding. Manufacturers could then guarantee uniformity of supplies, qualities, and flavour. This could be arranged when low values were likely. It had been done in America, and there was no reason why the example could not be followed here. A few years previously the Advisory Board of Agriculture expressed the opinion that action was desirable, and, when asked for a report, the manager of the Produce Export Department said, and rightly so at that time, that it was practically impossible to secure a supply of pigs suitable for the export trade. Inquiries were made for 100 suitable pigs likely to create a favourable impression in London, but they could not be obtained. Spasmodic trial shipments were subsequently made with varying results, and in one case, after all expenses were paid, the returns were just equal to those ruling locally; but at that time bacon and pork were at low values in London. Only recently the Yahl Factory (Mount Gambier) had sent to the London Dairy and Bacon Show a few sides of bacon that had to compete with the best English products, and, whilst not successful in gaining prizes, it was creditable to find that they beat the New South Wales exhibit by five points. Yet when sold the price netted was approximately 6d. per lb., which was not nearly equal to present local values. Australian bacon suffered by contrast with the English on account of not being specially dressed to English custom, and the flavour did not compare with the English specially fed hogs. England's bill for imported pig products during the past year was approximately £25,000,000 to £26,000,000, and with American consumption overtaking supplies there was a brighter outlook for Australia. Yet the number of pigs had not shown any appreciable increase for 14 years. In South Australia alone 14,000 fewer pigs passed through the Adelaide market in 1913 than was the case in 1912. Present values warranted the feeding of pigs at high pressure, especially now farmers were experiencing difficulty in obtaining remunerative

values for produce such as barley, oats, potatoes, &c. The reverse practice should obtain when foodstuffs were at higher values, and pigs were cheap. Then it was justifiable to treat the pig as the consumer of coarse farm produce, steadily growing into a good frame as a store, to be subsequently fattened up upon concentrated foods.

## FEEDING YOUNG PIGS.

Successful feeding of pigs provided one of the most difficult tasks of the farmer. If he pulled the litter through the first 24 hours after birth, he had gone a long way towards successful rearing. Half of the losses among young pigs occurred soon after birth, for many were laid upon unless vigilance was exercised. A lot depended on the health of the sow prior to farrowing. Sows should not be too fat, but should not be allowed to get too low in condition, or they would not provide sufficient milk for their young, nor would the young be so vigorous. Consequently growth would be checked at a period when the piglets should acquire a habit of rapid growth. The sow should come in two weeks before farrowing. A good practice was to give her half a pint of castor oil in the food within a couple of days before farrowing. For a week before it was recommended giving her two bran mashes and a couple of handfuls of bran in the food daily. Prior to this she should have been in a small grass, lucerne, or clover paddock, where she could have sufficient exercise to keep her in good health.

These simple precautions often obviated a vast amount of trouble, and reduced loss by assisting the sow to more readily deliver her young in a much better condition. Often when a sow experienced trouble one or two suckers were born much earlier than the remainder, and in the cold weather these contracted a chill and died, or the sow, being restless, rolled upon them. Further, a sow judiciously fed before farrowing had not the same inclination to devour her young. This habit was due to a depraved appetite. After farrowing was completed, the sow should be moderately fed during the first four days, especially if her udder were well flushed with milk, as the young ones might not take it away fast enough. As a rule she should be given a nice warm feed of milk and bran with a little pollard, but no grain, because it might cause constipation and affect her milk, and consequently the young. At all times a supply of charcoal with, say, a mixture of 25 lb. of lime and 1 lb. of salt, or ½ lb. of saltpetre, should be placed where sows could readily get it in their sties. The sties should admit sunlight, possess good drainage, be free from draughts, and have well-laid floors. If possible a small railing should be placed around the three sides—say 5 in. or 6 in. high, and 8 in. from the walls. The young pigs could then get away safely from their mother when she laid down. The bedding or straw for farrowing sows should not be long, for invariably it was the cause of a death or two among the young suckers, owing to the ease with which they become embedded and consequently laid upon.

Wheaten straw was the best to use for bedding. The little pigs until about three weeks old did little else but sleep and drink. They should not be allowed to roam at large with the mother. When it was noticed

that they had a disposition to do so, it was time to give them a little drink on their own, for much depended upon getting them to learn to drink early. Milk which had had the chill taken off should be supplied in a shallow, clean tin trough, where the sow could not gain access to it. Care should be exercised to see that the suckers did not gorge themselves, or bowel trouble would occur.

If anything were mixed with the milk—say at four weeks—a little barley-meal, but not bran, was recommended. As they grew the pigs might have a little scalded pollard added. This prepared them for the critical period of weaning, which should take place at about eight weeks old. Young pigs rarely went wrong, and, if they did, it was generally due to ill-judged feeding just before or after weaning. All male pigs should be emasculated at about three or four weeks old. If castrated, say, at six weeks to two months, they invariably possessed a much thicker rind when made into bacon. With liberal feeding in the form of milk or whey with pollard, soaked, crushed barley, wheat, and green feed, the young pigs should have made good growth at eight weeks old, and were then well able to look after themselves. Should they scour at any time when sucking the sow, the food of the latter should be changed. When weaned, they should be fed at frequent intervals to minimise the loss of their mother's milk as much as possible.

## FEEDING.

"The opportunity to make money out of pigs is," he continued, "to a large extent governed by methods of feeding—the general aim should be to supply at the least cost a ration producing the highest quality of pork or bacon. In years gone by the main object was to produce a pig of extra heavy weight, but what is now required is a younger and lighter pig for Australian use—for pork, say, 80 lb. to 90 lb.; and bacon 120 lb. dressed weight. The English market demands heavier pigs, say, from 160 lb. to 180 lb. The pig killing 120 lb. weight for bacon is the most economically fed. A young pig, if properly fed, will produce 1 lb. of green pork out of 4 lb. of food equal in food value to pollard, whilst a fully-matured pig may take from 6 lb. to 8 lb. to make the same gain of 1 lb. in weight. Taking pollard at 1s. per bushel, or 0·6d. per lb., when fed to a young pig the pork will cost less than 2½d. per lb., whereas the cost of adding weight to a pollard-fed mature pig is over 3½d. each lb.

"Pigs may fairly be said to be the most economical meat producers of all farm stock, judged by the quantity of meat for the food consumed. The average weight of a sucker when born is 2½ lb., and from reliable records we find that under proper management they will make an increase in weight during the first week of almost 2 lb., equal to an increase of, say, 76 per cent. The percentage gain in weight for food consumed becomes less every week, until in the sixteenth or seventeenth week the increase is not more than 6 per cent. There is a difference of opinion in the mind of feeders whether it is better to cook grain or simply to soak it. Soaking has proved to be the preferable method, being cheaper and handier. Exhaustive experiments have proved that on an average 505 lb. of cooked grain will produce 100 lb. of pork, whereas 476 lb. soaked

will give the same results. Another point of interest was proved—viz., that by feeding mixed grains a saving of at least 15 per cent. in the amount required to produce 1 lb. of pork was effected.

"The maintenance requirements of a pig have been set down at 2 lb. of food possessing the equivalent food value of 2 lb. pollard for every 100 lb. live weight, and it is only when they receive food in excess of this amount that they make increased weight and lay on flesh. Providing they are properly fed, then the more they can be encouraged to consume in 24 hours the quicker will they be fit for market. The feeder should never allow any excess over requirements to be left in the trough, feeding only just what they will clean up. It is not advisable when feeding to give it in too sloppy a condition, but more of the consistency of porridge—say, 3 of milk, whey, or water to 1 of solids—pollard, barley, wheat, &c. A plentiful supply of good water should at all times be available for the pigs. When young growing pigs are out running on pastures, do not cut off their supply of milk and grain, but give a little always, and finish them off in the sty with grain. If during the period between the sixth to the twelfth week of the life of the pig it is injudiciously fed and stunted, it will become a poor doer, and, no matter what subsequent treatment it may receive, will not be so profitable.

"Solid foodstuffs recommended are:—Peas, beans, barley, oats, bran, pollard, rye, wheat; greenstuffs include lucerne, clover, peas, barley; roots comprise potatoes, mangels, swedes, artichokes, &c.; and liquids, skim milk, water, and whey. Peas provide a large percentage of protein or nitrogenous matter, and are consequently good for young growing pigs and the production of lean bacon. If fed whole, they are very palatable, but prove too wasteful, a large percentage passing through the system undigested. When crushed, they are better. Pea-meal, whilst a valuable food, must not be fed alone. It is difficult to digest, and is likely to sicken pigs. A good plan is to add a little ground oats with the peas. Beans, where they can be grown successfully, prove excellent food. They are rich in protein, and are thus valuable for enriching the ration. However, if fed in any considerable quantity, they will result in producing what is known as a soft bacon; so for best results it is advisable to feed them with other grain.

"Barley may with truth be described as the best of all grains for pigs, especially for the production of good bacon. This applies both for quantity and quality. Barley should always be crushed and soaked, and for young pigs should be mixed with pollard. Damaged wheat is also a valuable food for the production of good bacon, and gives better results when converted into pork than when sold as grain. It takes on an average 5 lb. of wheat to produce 1 lb. of pork. Split or damaged wheat can at most times be turned over to a greater profit in this way. Rye has a lower feeding value than either wheat or barley. It will, however, produce an equal increase in weight of the pig, but the quality of the flesh is inferior, and therefore it is advisable to mix it with other grain. Where oats are largely used, the husks should be removed by soaking in water. They are excellent food for feeding grown pigs, making good meat, but they have a slight disadvantage, being of rather too fibrous a

nature for young pigs. A little crushed oats are best mixed with other foods. The famous York hams are supposed to owe much of their excellent flavour to the fact that the pigs are very largely fed upon oatmeal.

## MILL AND DAIRY BY-PRODUCTS.

"Pollard has at all times proved an excellent food when fed to pigs of all ages and for all purposes; but, having the reputation of producing pork of rather a soft nature, for this reason it may be better fed with a little barley or damaged wheat. Pollard when fed with milk gives very satisfactory all-round results. Bran, although rich in protein content, must not be accepted as a pig fattener. It is an excellent milk producer, and for this reason is valuable food for a sow just before or after farrowing. It also has the effect of keeping the bowels in good order. Because of the high food value of separator milk, dairying and pig-raising must go hand in hand for best returns. By no means can pigs be so profitably turned into good baconers as where a liberal supply of skim milk is available. To obtain fullest value, it must be fed in conjunction with any of the grains grown upon the farm. Whilst of considerable value as a food, whey is not equal to skim milk or butter-milk, especially when fed to younger pigs. Again, it will not produce as good a quality of bacon unless it has other foods rich in protein content added to it. The bulk of this valuable food constituent is taken from the whole milk to form cheese. The feeding value of whey is really only half that of separator milk. In Denmark the results obtained from most exhaustive experiments proved that for feeding purposes 6 lb. of skim milk were equal to 12 lb. of whey or 1 lb. of crushed barley. When feeding whey it is advisable to use, say, 3 lb. to 4 lb. with 1 lb. of crushed barley-meal or pollard. Pure butter-milk to which no water has been added is of equal food value to skim milk. Farmers must not forget that this when obtained at factories almost always has a large quantity of water, possibly 30 per cent. to 50 per cent., added to it. Many instances could be given of considerable loss being occasioned where pigs were fed on watered butter-milk alone—a form of starvation—there being insufficient nutriment or solids present to satisfy the ordinary maintenance of body demands. Butter-milk, as taken from the factories, when fed with grain or pollard, &c., to make up for any deficiency in nutriment, will give good results.

## GAIN IN LIVE WEIGHTS.

"Taking it that the young pig when ready to wean weighs 26 lb. to 32 lb. live weight, at 10 weeks he should weigh 40 lb., and at 6 to 7 months he should turn the scale at 150 lb. to 180 lb. live weight. The following will produce 1 lb. extra of flesh, viz.:—4½ lb. of soaked barley, or, preferably, 3·64 lb. of soaked barley with 5 lb. of separated milk, putting on the extra weight from 40 lb. to 180 lb. at the following cost, milk being free:—Ten and a-half bushels of barley at 2s., £1 1s. Seventy gallons of separated milk would also be required. Assuming the young pigs cost the breeder at 10 weeks 19s., the total cost till ready for the knife would be £2. At present values the pig weighing 160 lb. live weight would realise £3 10s., leaving a profit of 30s. per pig. This gives a return

of 4s. per bushel for barley and 9s. for any little labour connected with the feeding and skim milk. The mating of very young sows with the boar at 6 to 7 months is not always advisable. A difference of opinion exists whether to mate at 6, 10, or 15 months; but generally the 10 months is accepted as the better age. The young sow may be very restless or excited when farrowing owing to inexperience, and at times a shortness of milk supply will result. In this case remove the young, and when the sow finishes farrowing quietly place one or two little ones to her teats; she will then generally respond and let down her milk, when all suckers may be put with her. Young and very aged sows should be fed three times daily when suckling a good litter, the food being of soft character, warm, and easily digested.

## RETURN FOR VARIOUS RATIONS.

"Pigs of from 60 lb. to 100 lb. live weight consume on an average 3·35 lb. of foods, say, pollard, per day; and when at 100 lb. to 150 lb. of live weight, 4¾ lb. If pure butter-milk only is fed, the pig would require to consume 6 gallons to obtain sufficient nutriment, whilst 9 gallons of ordinary diluted butter-milk would be necessary if used as a substitute. Potatoes offer many advantages to pigkeepers when the price is low, like barley and oats; so that nothing better can be done than to feed them. They require to be fed in conjunction with grain, more specially with milk or whey. The best results are obtained by feeding 4 lb. of soaked grain, 4 lb. of skimmed milk, and 3 lb. of potatoes. In food value 4 lb. of potatoes are equivalent to 1 lb. of barley or wheat as a food. Potatoes, although good when fed raw, are improved very much by pulping and cooking. They should always be cooked, and the water from the potatoes should not be used, as the tannin contained in it will coat the stomach, and prevent a free and natural secretion of the digestive fluids. When fed to young pigs, the following rations will be required:—No. 1—Cooked potatoes, 3 lb.; skimmed milk, 10 lb.; or No. 2—Cooked potatoes, 4 lb.; butter-milk, 6 lb.; barley, 1 lb. Sugar beets are preferred by pigs to any other roots. It is not advisable to give them too freely, but they may form a fourth of the ration. Lucerne, tares, and clover are all valuable for grazing, or feeding a little in the sties; but grain must also be given. Molasses is sometimes given to pigs in small quantities, say, 1 lb. per day; its chief value is as an appetiser. Any kind of fruit may be fed, but it must be distinctly understood that grain must also be added. All pigs are the better for a run in a nice, handy, well-grassed paddock of lucerne.

## EARLY MATURITY.

"The secret of producing early pork is to give a liberal allowance of green feed. When fattening for bacon, it is advisable to put pigs in the pen at, say, 5 months old. At this age, if judiciously fed, they will develop into nice-conditioned baconers at 6 to 7 months, and weigh from 120 lb. to 130 lb. dressed. Porkers should weigh 70 lb. to 90 lb., and this weight can be produced at 4 or 5 months, according to breed and feeding. Danish breeders mix their grain as follows:—For pigs up to 4 months old: Mixture, 8 parts of wheat, 8 parts of barley, 1 part of oats. For

pigs over 4 months: Mixture, 14 parts barley, 4 parts wheat, 1 part oats. All the food is soaked and crushed, and green food is supplied at midday. For a sow producing two litters (each of eight suckers) a year, a farmer would require to provide the following amount of food to rear them:—Daily rations for sow carrying litter: 7 lb. to 8 lb. of grain, 1½ gallons separated milk, 5 lb. of good green lucerne. It will take approximately 18 bushels to 20 bushels of grain and 75 gallons of skimmed milk to rear each pig, inclusive of feeding to sow; to rear 16, 36 bushels of grain, 1,250 gallons of skimmed milk, and green feed.

"Daily rations for pigs, supplying all that is necessary for body development and fattening, with skimmed milk not charged up in the costs, include:—No. 1: Daily rations from 2 to 3 months old, 6 lb. of skimmed milk, 1½ lb. of pollard, 1 lb. of barley. The month's total food amounts to 45 lb. of pollard, 30 lb. of barley, and 18 gallons of skimmed milk; total cost, 3s. 5d. No. 2: Daily ration from 3 to 5 months old, 2 lb. of wheat, 2 lb. of barley, 6 gallons of skimmed milk. Total requirements for the two months (60 days), 120 lb. wheat at 3s. per bushel, 150 lb. of barley at 1s. 10d., 36 gallons of skimmed milk; total cost, 11s. 6d. From 5 to 6 months old a daily ration is recommended as follows:—3 lb. of skimmed milk, 2 lb. of wheat, 3½ lb. of barley. This would cost for the month—Wheat, 3s.; barley, 3s. 10d.; with total cost for the month's feeding, 6s. 10d. In the final month (sixth to seventh month) peas may be fed with the ration to top off. Where no peas are grown, feed daily 1½ lb. of wheat, 5½ lb. of barley. With wheat costing 2s. 3d. and barley 6s., the total cost for the month would be 8s. 3d. The total cost of food from weaning to marketing condition would be £1 10s., made up as follows:—Barley, 9 bushels at 1s. 10d. on farm, 16s. 6d.; wheat, 3 bushels 45 lb. at 3s. on farm, 11s. 3d.; pollard, 2¼ bushels at 1s. on farm, 2s. 3d. Where potatoes are low in value or unsuitable for market, they may be fed with much success. A good ration for fattening a pig is 1 gallon of skimmed milk or butter-milk, 4 lb. of soaked barley, and 3 lb. of cooked potatoes. A little green lucerne during the summer, or lucerne hay during the winter, is an excellent food in conjunction with the rations mentioned, varying the quantity from 1 lb. to 3 lb. daily, according to age.

## STUDY MEAT AND FODDER MARKETS.

"It has been shown that one can raise a properly cared for young pig from 2 months of age until ready for market, when 160 lb. live weight, at a cost of 30s. Such a pig would realise from 75s. to 85s., leaving a substantial profit. To dairymen, who can best raise pigs profitably on account of their having skimmed milk, it requires approximately 80 gallons to feed the sow and raise each young pig. Therefore, 1 sow to every 8 cows kept should be a safe margin, or perhaps it would be better to say 1 cow to every sucker. A sow producing two litters of eight in each litter requires the following food daily, when carrying her litter for, say, eight weeks:—6 lb. to 8 lb. of grain, 1½ gallons of skimmed milk, 5 lb. of greenstuff, lucerne, &c. With foodstuffs at present low values, and pigs realising excellent prices, there are great possibilities in pig-raising.

especially in districts where cows are kept as the main source of income. Such a fine source of revenue should not be neglected. In conclusion, it may be said that a liberal feeder may easily let the profits slip through his fingers by keeping his pigs in dirty, draughty, and cold sties; feeding a badly-bred, non-thrifty, long-legged, and unshapely animal; or by irregularity in feeding and careless marketing. When forwarded to market, the pigs should be well protected from the sun and given, if possible, a good hosing with water; this will add to their comfort, and improve their appearance. They should not be travelled upon a full stomach. This caution is especially applicable in hot weather, as it often means the death of one or more. At present values it would be ridiculous to think of exporting. This can only be entertained when values are at a much lower level. The pig business to-day, and, so far as one can foresee into the future, is a most profitable proposition by reason of easy breeding, cheap feeding, and highly remunerative values obtainable at an early age."—"The Dairyman," Toowoomba.

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## TIMES OF SUNRISE AND SUNSET AT BRISBANE—1914.

| Date. | SEPTEMBER. | | OCTOBER. | | NOVEMBER. | | DECEMBER. | |
|---|---|---|---|---|---|---|---|---|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. |
| 1 | 6·3 | 5·33 | 5·29 | 5·47 | 4·58 | 6·5 | 4·46 | 6·28 |
| 2 | 6·2 | 5·34 | 5·28 | 5·48 | 4·58 | 6·6 | 4·46 | 6·28 |
| 3 | 6·1 | 5·34 | 5·27 | 5·48 | 4·57 | 6·7 | 4·46 | 6·29 |
| 4 | 6·0 | 5·35 | 5·26 | 5·49 | 4·56 | 6·7 | 4·46 | 6·30 |
| 5 | 5·59 | 5·35 | 5·25 | 5·49 | 4·56 | 6·8 | 4·46 | 6·31 |
| 6 | 5·58 | 5·36 | 5·24 | 5·50 | 4·55 | 6·9 | 4·46 | 6·31 |
| 7 | 5·57 | 5·36 | 5·23 | 5·50 | 4·54 | 6·9 | 4·46 | 6·32 |
| 8 | 5·56 | 5·37 | 5·21 | 5·50 | 4·54 | 6·10 | 4·46 | 6·33 |
| 9 | 5·54 | 5·37 | 5·20 | 5·51 | 4·53 | 6·11 | 4·46 | 6·33 |
| 10 | 5·53 | 5·37 | 5·19 | 5·52 | 4·52 | 6·11 | 4·47 | 6·34 |
| 11 | 5·52 | 5·38 | 5·18 | 5·52 | 4·52 | 6·12 | 4·47 | 6·35 |
| 12 | 5·51 | 5·38 | 5·17 | 5·53 | 4·51 | 6·13 | 4·47 | 6·36 |
| 13 | 5·50 | 5·39 | 5·16 | 5·53 | 4·51 | 6·14 | 4·47 | 6·36 |
| 14 | 5·49 | 5·39 | 5·15 | 5·54 | 4·50 | 6·14 | 4·48 | 6·37 |
| 15 | 5·48 | 5·40 | 5·14 | 5·54 | 4·50 | 6·15 | 4·48 | 6·37 |
| 16 | 5·46 | 5·40 | 5·13 | 5·55 | 4·49 | 6·16 | 4·48 | 6·38 |
| 17 | 5·45 | 5·41 | 5·12 | 5·56 | 4·49 | 6·17 | 4·48 | 6·39 |
| 18 | 5·44 | 5·42 | 5·11 | 5·56 | 4·49 | 6·18 | 4·49 | 6·39 |
| 19 | 5·43 | 5·42 | 5·10 | 5·57 | 4·48 | 6·18 | 4·49 | 6·40 |
| 20 | 5·42 | 5·42 | 5·9 | 5·57 | 4·48 | 6·19 | 4·50 | 6·40 |
| 21 | 5·41 | 5·42 | 5·8 | 5·58 | 4·47 | 6·20 | 4·50 | 6·41 |
| 22 | 5·40 | 5·43 | 5·7 | 5·58 | 4·47 | 6·21 | 4·51 | 6·42 |
| 23 | 5·38 | 5·43 | 5·6 | 5·59 | 4·47 | 6·22 | 4·51 | 6·42 |
| 24 | 5·37 | 5·44 | 5·5 | 6·0 | 4·47 | 6·22 | 4·52 | 6·43 |
| 25 | 5·36 | 5·44 | 5·4 | 6·0 | 4·47 | 6·23 | 4·52 | 6·43 |
| 26 | 5·35 | 5·45 | 5·4 | 6·1 | 4·46 | 6·24 | 4·53 | 6·43 |
| 27 | 5·34 | 5·45 | 5·3 | 6·2 | 4·46 | 6·25 | 4·53 | 6·44 |
| 28 | 5·33 | 5·46 | 5·2 | 6·2 | 4·46 | 6·25 | 4·54 | 6·44 |
| 29 | 5·32 | 5·46 | 5·1 | 6·3 | 4·46 | 6·26 | 4·54 | 6·44 |
| 30 | 5·30 | 5·47 | 5·0 | 6·4 | 4·46 | 6·27 | 4·55 | 6·45 |
| 31 | ... | ... | 4·59 | 6·5 | ... | ... | 4·56 | 6·45 |

**PHASES OF THE MOON.**

| Date | | Phase | H. | M. |
|---|---|---|---|---|
| 5 Sept. | ○ | Full Moon | 12 | 1 a.m. |
| 13 „ | ☽ | Last Quarter | 3 | 48 „ |
| 20 „ | ● | New Moon | 7 | 33 „ |
| 26 „ | ☾ | First Quarter | 10 | 3 p.m. |
| 4 Oct. | ○ | Full Moon | 3 | 59 p.m. |
| 12 „ | ☽ | Last Quarter | 7 | 33 „ |
| 19 „ | ● | New Moon | 4 | 33 „ |
| 26 „ | ☾ | First Quarter | 8 | 44 a.m. |
| 3 Nov. | ○ | Full Moon | 9 | 49 a.m. |
| 11 „ | ☽ | Last Quarter | 9 | 37 „ |
| 18 „ | ● | New Moon | 2 | 2 „ |
| 24 „ | ☾ | First Quarter | 11 | 39 p.m. |
| 3 Dec. | ○ | Full Moon | 4 | 21 a.m. |
| 10 „ | ☽ | Last Quarter | 9 | 32 p.m. |
| 17 „ | ● | New Moon | 12 | 35 „ |
| 24 „ | ☾ | First Quarter | 6 | 25 „ |

# Poultry.

## REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, AUGUST, 1914.

Five thousand seven hundred and sixty-six eggs were laid during the month; an average of 144 per pen. The birds are now doing good work, all being now over the moult, with the exception of one of J. M. Manson's, which is in heavy moult. T. Fanning's Black Orpingtons win the monthly prize with 165 eggs. The following are the individual records:—

| Competitors. | Breed. | August. | Total. |
|---|---|---|---|
| T. Fanning ... | White Leghorns | 131 | 610 |
| Kelvin Poultry Farm | Do. | 141 | 583 |
| A. T. Coomber | Do. | 143 | 571 |
| Moritz Bros., S.A. | Do. | 152 | 520 |
| Loloma Poultry Farm, N.S.W. | Do. | 154 | 515 |
| Loloma Poultry Farm, N.S.W. | Rhode Island Reds | 152 | 511 |
| R. Burns | Black Orpingtons (No. 1) | 162 | 492 |
| J. T. Coates | Do. | 142 | 484 |
| Geo. Tomlinson | White Leghorns | 159 | 482 |
| J. P. Wilson | Do. | 124 | 472 |
| Cowan Bros., N.S.W. | Do. | 154 | 466 |
| R. Burns | S. L. Wyandottes | 162 | 462 |
| E. Le Breton | White Leghorns | 160 | 445 |
| R. Jobling, N.S.W. | Do. | 140 | 441 |
| A. F. Camkin, N.S.W. | Do. | 145 | 442 |
| G. E. Austin | Do. | 132 | 440 |
| Mrs. Bieber | Brown Leghorns | 142 | 439 |
| J. Gosley | White Leghorns | 135 | 438 |
| R. Burns | Black Orpingtons (No. 2) | 153 | 438 |
| J. D. Nicholson, N.S.W. | White Leghorns | 131 | 432 |
| A. H. Padman, S.A. | Do. | 159 | 425 |
| E. V. Bennett, S.A. | Do. | 151 | 422 |
| J. Franklin | Do. | 155 | 422 |
| Mrs. Munro | Do. | 153 | 416 |
| J. Manson | Do. (No. 1) | 139 | 414 |
| T. Fanning | Black Orpingtons | 165 | 414 |
| J. T. Coates | White Leghorns | 141 | 411 |
| Marville Poultry Farm, Victoria | Do. | 148 | 407 |
| J. Kilroe | Do. (No. 1) | 119 | 405 |
| Derrylin Poultry Farm | Do. | 144 | 402 |
| F. McCauley | Do. | 142 | 400 |
| J. Kilroe | Do. (No. 2) | 134 | 392 |
| D. Moreton | Do. | 140 | 388 |
| Range Poultry Farm | Do. | 148 | 375 |
| J. Zahl | Do. | 140 | 373 |
| Mrs. Bradburne, N.S.W. | Do. | 135 | 372 |
| J. N. Waugh, N.S.W. | Do. | 125 | 365 |
| C. M. Jones | Do. | 144 | 342 |
| J. M. Manson | Do. (No. 2) | 128 | 318 |
| J. Murchie | Brown Leghorns | 139 | 318 |
| Total | ... | 5,766 | 17,464 |

## THE COMMERCIAL SIDE OF POULTRY KEEPING.

To rear poultry as an adjunct to dairy-farming, pig-breeding, or market gardening is one thing. To rear poultry for profit on a poultry farm is quite another proposition. The Rev. T. W. Sturges, M.A., discussing this matter in his exhaustive work on poultry, says that poultry keeping as a hobby is a delightful occupation, and to the vast multitudes who undertake it for this end is due the fact that it may sometimes be made a commercial success. There is no reason why anyone of average intelligence should not make his poultry repay him for the trouble bestowed. But to make it the sole business of life from which the maintenance of a man and his family may be derived, is quite another matter. To look upon the calling as a sort of oasis in the desert—an Arcadia of life, where fruits grow without the planting or watering—is little short of a delusion. Many have made a shipwreck of their hopes in attempting it; of the many who have tried it none have found it to answer, or, if any have done so, they have kept the fact a profound secret. That the small farmer who keeps twenty or thirty head of poultry has found it reasonably profitable is no answer to the question. The food bill on a farm is small, and the garden and house scraps supply the bulk of it. The case is very different with the poultry farmer pure and simple. His expenses are heavy for feed, housing, transport, &c. There are delusive books—fairy tales which narrate such easy problems as: "If 4 hens cost £1 a year to keep, and lay eggs, which, at 1d. each, bring in £2, or £1 profit, then 400 hens will bring in £100, and 4,000 hens £1,000"; and so on. Other misleading statements are based on a single hen bringing in 30s. a year! Multiply this by 200, and you have £300 a year. All you need for this is a cottage and a couple of acres of land, since every hen will lay in the winter 100 eggs, which sell at 2s. a dozen; and those she lays and hatches in the summer will find a ready sale as day-old chicks at a guinea a dozen, &c., &c. When a new breed shall have been discovered with a clockwork interior which needs only a yearly winding up, and is guaranteed to keep time, then "success will be certain." Meanwhile, we wait!

If these schemes were practical on a colossal scale, millionaires would be as plentiful as blackberries in autumn. Mr. Sturges puts it down as a very good average result that, if a poultry farmer on this system gets 5s. per head, he is doing well. And if he has 400 birds to look after, and has to raise his yearly flock of chickens to replace the old ones, he will be fully occupied. Where one man does this, seventy fail to do so; most who have tried it have to be content with less, and very many have failed to make both ends meet. But, it will be said, "There are poultry farmers who earn a good livelihood." The answer is, "Yes, there are many who do so, but it is not by such methods." These are men who have made a study of the business, and have not taken to it because they have failed at everything else. They have either served an apprenticeship to the business with those who have already been successful, or have served the longer apprenticeship of experience.

The people who make a good livelihood out of poultry farming are not those who keep hens simply to supply the table with fresh eggs and dead poultry, but those who breed purebred poultry of the more popular

breeds and varieties and sell the eggs for hatching purposes, and raise stock and sell them to others for breeding or for exhibition, or exhibit the birds in their own names.

Mr. Sturges divides these roughly into two classes—(1) Those who breed chiefly for exhibition purposes, and by means of advertising and exhibiting their stock, get enhanced prices for them, as well as high prices for the eggs they sell for hatching. (2) Those to whom exhibiting is only a minor part, but who breed high-class stock, and sell a great number of both for breeding and for laying to the very large number of patrons who like to see purebred stock about them. It is entirely due to the fancier that we have breeds and varieties of fowls that will lay from 150 to 180 eggs or more a year. The absolute mongreldom which still prevails on the average farm homesteads, as well as in the cities and suburbs, would have been universal had it not been for the fancier and his carefully selected stock.

As far as eggs for the markets is concerned, there is an unlimited demand all over the State. Grocers and other tradesmen who sell them are always willing to buy and pay fair prices for clean, fresh-laid eggs, prices fluctuating, of course, according to the season of the year.

## LEGHORN-ORPINGTON.

"Here is an interesting item about breeding," says an Exchange: "Say you have some Black Orpington hens that turned into lay when they were eight months old. If you put a Leghorn cock with these hens, the crossbred pullets will turn into lay at six months, and they will be shapely birds—a cross between the neat, clean-cut Leghorn and the bulky Orpington. In fact, also, the crossbreeds will all be white with the exception of a few black splashes and spots here and there that will show up on some, but most of them will be all white. The Orpington is practically rubbed out in the combination excepting that most of the crossbred pullets will become broody, same as their mothers, and the eggs will be tinted. They won't be white-shelled like those of the Leghorns, nor a rich brown like those of the Orpingtons.

"Another breeding 'tip': 'Do what you will you can't breed out the rose comb,' says the same writer. 'You may go in for as many crosses or combinations with single breeds as you like, but when the rose comb once gets in, it is there to stay, and it will pop up for all time afterwards. Not every year, may be, but it will show up every now and again, and you will never breed it out. You know the Dorking has five toes? Well, the same remarks apply—once you get the five toes into a strain you will never breed it out.'

"You will Never Breed out the Rose.—That seems to us quite a mild way of putting it. If strong brown egg swamps weak white egg, strong broody swamps non-broody, strong white colour swamps weak black, strong Leghorn type swamps weak Orpington type, strong early laying swamps weak late laying, strong normal toe swamps weak fifth toe, why does not strong rose comb swamp weak single comb? The

values for produce such as barley, oats, potatoes, &c. The reverse practice should obtain when foodstuffs were at higher values, and pigs were cheap. Then it was justifiable to treat the pig as the consumer of coarse farm produce, steadily growing into a good frame as a store, to be subsequently fattened up upon concentrated foods.

## FEEDING YOUNG PIGS.

Successful feeding of pigs provided one of the most difficult tasks of the farmer. If he pulled the litter through the first 24 hours after birth, he had gone a long way towards successful rearing. Half of the losses among young pigs occurred soon after birth, for many were laid upon unless vigilance was exercised. A lot depended on the health of the sow prior to farrowing. Sows should not be too fat, but should not be allowed to get too low in condition, or they would not provide sufficient milk for their young, nor would the young be so vigorous. Consequently growth would be checked at a period when the piglets should acquire a habit of rapid growth. The sow should come in two weeks before farrowing. A good practice was to give her half a pint of castor oil in the food within a couple of days before farrowing. For a week before it was recommended giving her two bran mashes and a couple of handfuls of bran in the food daily. Prior to this she should have been in a small grass, lucerne, or clover paddock, where she could have sufficient exercise to keep her in good health.

These simple precautions often obviated a vast amount of trouble, and reduced loss by assisting the sow to more readily deliver her young in a much better condition. Often when a sow experienced trouble one or two suckers were born much earlier than the remainder, and in the cold weather these contracted a chill and died, or the sow, being restless, rolled upon them. Further, a sow judiciously fed before farrowing had not the same inclination to devour her young. This habit was due to a depraved appetite. After farrowing was completed, the sow should be moderately fed during the first four days, especially if her udder were well flushed with milk, as the young ones might not take it away fast enough. As a rule she should be given a nice warm feed of milk and bran with a little pollard, but no grain, because it might cause constipation and affect her milk, and consequently the young. At all times a supply of charcoal with, say, a mixture of 25 lb. of lime and 1 lb. of salt, or ½ lb. of saltpetre, should be placed where sows could readily get it in their sties. The sties should admit sunlight, possess good drainage, be free from draughts, and have well-laid floors. If possible a small railing should be placed around the three sides—say 5 in. or 6 in. high, and 8 in. from the walls. The young pigs could then get away safely from their mother when she laid down. The bedding or straw for farrowing sows should not be long, for invariably it was the cause of a death or two among the young suckers, owing to the ease with which they become embedded and consequently laid upon.

Wheaten straw was the best to use for bedding. The little pigs until about three weeks old did little else but sleep and drink. They should not be allowed to roam at large with the mother. When it was noticed

that they had a disposition to do so, it was time to give them a little drink on their own, for much depended upon getting them to learn to drink early. Milk which had had the chill taken off should be supplied in a shallow, clean tin trough, where the sow could not gain access to it. Care should be exercised to see that the suckers did not gorge themselves, or bowel trouble would occur.

If anything were mixed with the milk—say at four weeks—a little barley-meal, but not bran, was recommended. As they grew the pigs might have a little scalded pollard added. This prepared them for the critical period of weaning, which should take place at about eight weeks old. Young pigs rarely went wrong, and, if they did, it was generally due to ill-judged feeding just before or after weaning. All male pigs should be emasculated at about three or four weeks old. If castrated, say, at six weeks to two months, they invariably possessed a much thicker rind when made into bacon. With liberal feeding in the form of milk or whey with pollard, soaked, crushed barley, wheat, and green feed, the young pigs should have made good growth at eight weeks old, and were then well able to look after themselves. Should they scour at any time when sucking the sow, the food of the latter should be changed. When weaned, they should be fed at frequent intervals to minimise the loss of their mother's milk as much as possible.

## FEEDING.

"The opportunity to make money out of pigs is," he continued, "to a large extent governed by methods of feeding—the general aim should be to supply at the least cost a ration producing the highest quality of pork or bacon. In years gone by the main object was to produce a pig of extra heavy weight, but what is now required is a younger and lighter pig for Australian use—for pork, say, 80 lb. to 90 lb.; and bacon 120 lb. dressed weight. The English market demands heavier pigs, say, from 160 lb. to 180 lb. The pig killing 120 lb. weight for bacon is the most economically fed. A young pig, if properly fed, will produce 1 lb. of green pork out of 4 lb. of food equal in food value to pollard, whilst a fully-matured pig may take from 6 lb. to 8 lb. to make the same gain of 1 lb. in weight. Taking pollard at 1s. per bushel, or 0·6d. per lb., when fed to a young pig the pork will cost less than 2½d. per lb., whereas the cost of adding weight to a pollard-fed mature pig is over 3½d. each lb.

"Pigs may fairly be said to be the most economical meat producers of all farm stock, judged by the quantity of meat for the food consumed. The average weight of a sucker when born is 2½ lb., and from reliable records we find that under proper management they will make an increase in weight during the first week of almost 2 lb., equal to an increase of, say, 76 per cent. The percentage gain in weight for food consumed becomes less every week, until in the sixteenth or seventeenth week the increase is not more than 6 per cent. There is a difference of opinion in the mind of feeders whether it is better to cook grain or simply to soak it. Soaking has proved to be the preferable method, being cheaper and handier. Exhaustive experiments have proved that on an average 505 lb. of cooked grain will produce 100 lb. of pork, whereas 476 lb. soaked

will give the same results. Another point of interest was proved—viz., that by feeding mixed grains a saving of at least 15 per cent. in the amount required to produce 1 lb. of pork was effected.

"The maintenance requirements of a pig have been set down at 2 lb. of food possessing the equivalent food value of 2 lb. pollard for every 100 lb. live weight, and it is only when they receive food in excess of this amount that they make increased weight and lay on flesh. Providing they are properly fed, then the more they can be encouraged to consume in 24 hours the quicker will they be fit for market. The feeder should never allow any excess over requirements to be left in the trough, feeding only just what they will clean up. It is not advisable when feeding to give it in too sloppy a condition, but more of the consistency of porridge—say, 3 of milk, whey, or water to 1 of solids—pollard, barley, wheat, &c. A plentiful supply of good water should at all times be available for the pigs. When young growing pigs are out running on pastures, do not cut off their supply of milk and grain, but give a little always, and finish them off in the sty with grain. If during the period between the sixth to the twelfth week of the life of the pig it is injudiciously fed and stunted, it will become a poor doer, and, no matter what subsequent treatment it may receive, will not be so profitable.

"Solid foodstuffs recommended are:—Peas, beans, barley, oats, bran, pollard, rye, wheat; greenstuffs include lucerne, clover, peas, barley; roots comprise potatoes, mangels, swedes, artichokes, &c.; and liquids, skim milk, water, and whey. Peas provide a large percentage of protein or nitrogenous matter, and are consequently good for young growing pigs and the production of lean bacon. If fed whole, they are very palatable, but prove too wasteful, a large percentage passing through the system undigested. When crushed, they are better. Pea-meal, whilst a valuable food, must not be fed alone. It is difficult to digest, and is likely to sicken pigs. A good plan is to add a little ground oats with the peas. Beans, where they can be grown successfully, prove excellent food. They are rich in protein, and are thus valuable for enriching the ration. However, if fed in any considerable quantity, they will result in producing what is known as a soft bacon; so for best results it is advisable to feed them with other grain.

"Barley may with truth be described as the best of all grains for pigs, especially for the production of good bacon. This applies both for quantity and quality. Barley should always be crushed and soaked, and for young pigs should be mixed with pollard. Damaged wheat is also a valuable food for the production of good bacon, and gives better results when converted into pork than when sold as grain. It takes on an average 5 lb. of wheat to produce 1 lb. of pork. Split or damaged wheat can at most times be turned over to a greater profit in this way. Rye has a lower feeding value than either wheat or barley. It will, however, produce an equal increase in weight of the pig, but the quality of the flesh is inferior, and therefore it is advisable to mix it with other grain. Where oats are largely used, the husks should be removed by soaking in water. They are excellent food for feeding grown pigs, making good meat, but they have a slight disadvantage, being of rather too fibrous a

nature for young pigs. A little crushed oats are best mixed with other foods. The famous York hams are supposed to owe much of their excellent flavour to the fact that the pigs are very largely fed upon oatmeal.

## MILL AND DAIRY BY-PRODUCTS.

"Pollard has at all times proved an excellent food when fed to pigs of all ages and for all purposes; but, having the reputation of producing pork of rather a soft nature, for this reason it may be better fed with a little barley or damaged wheat. Pollard when fed with milk gives very satisfactory all-round results. Bran, although rich in protein content, must not be accepted as a pig fattener. It is an excellent milk producer, and for this reason is valuable food for a sow just before or after farrowing. It also has the effect of keeping the bowels in good order. Because of the high food value of separator milk, dairying and pig-raising must go hand in hand for best returns. By no means can pigs be so profitably turned into good baconers as where a liberal supply of skim milk is available. To obtain fullest value, it must be fed in conjunction with any of the grains grown upon the farm. Whilst of considerable value as a food, whey is not equal to skim milk or butter-milk, especially when fed to younger pigs. Again, it will not produce as good a quality of bacon unless it has other foods rich in protein content added to it. The bulk of this valuable food constituent is taken from the whole milk to form cheese. The feeding value of whey is really only half that of separator milk. In Denmark the results obtained from most exhaustive experiments proved that for feeding purposes 6 lb. of skim milk were equal to 12 lb. of whey or 1 lb. of crushed barley. When feeding whey it is advisable to use, say, 3 lb. to 4 lb. with 1 lb. of crushed barley-meal or pollard. Pure butter-milk to which no water has been added is of equal food value to skim milk. Farmers must not forget that this when obtained at factories almost always has a large quantity of water, possibly 30 per cent. to 50 per cent., added to it. Many instances could be given of considerable loss being occasioned where pigs were fed on watered butter-milk alone—a form of starvation—there being insufficient nutriment or solids present to satisfy the ordinary maintenance of body demands. Butter-milk, as taken from the factories, when fed with grain or pollard. &c., to make up for any deficiency in nutriment, will give good results.

## GAIN IN LIVE WEIGHTS.

"Taking it that the young pig when ready to wean weighs 26 lb. to 32 lb. live weight, at 10 weeks he should weigh 40 lb., and at 6 to 7 months he should turn the scale at 150 lb. to 180 lb. live weight. The following will produce 1 lb. extra of flesh, viz.:—4½ lb. of soaked barley, or, preferably, 3·64 lb. of soaked barley with 5 lb. of separated milk, putting on the extra weight from 40 lb. to 180 lb. at the following cost. milk being free:—Ten and a-half bushels of barley at 2s., £1 1s. Seventy gallons of separated milk would also be required. Assuming the young pigs cost the breeder at 10 weeks 19s., the total cost till ready for the knife would be £2. At present values the pig weighing 160 lb. live weight would realise £3 10s., leaving a profit of 30s. per pig. This gives a return

of 4s. per bushel for barley and 9s. for any little labour connected with the feeding and skim milk. The mating of very young sows with the boar at 6 to 7 months is not always advisable. A difference of opinion exists whether to mate at 6, 10, or 15 months; but generally the 10 months is accepted as the better age. The young sow may be very restless or excited when farrowing owing to inexperience, and at times a shortness of milk supply will result. In this case remove the young, and when the sow finishes farrowing quietly place one or two little ones to her teats; she will then generally respond and let down her milk, when all suckers may be put with her. Young and very aged sows should be fed three times daily when suckling a good litter, the food being of soft character, warm, and easily digested.

## RETURN FOR VARIOUS RATIONS.

"Pigs of from 60 lb. to 100 lb. live weight consume on an average 3·35 lb. of foods, say, pollard, per day; and when at 100 lb. to 150 lb. of live weight, 4¾ lb. If pure butter-milk only is fed, the pig would require to consume 6 gallons to obtain sufficient nutriment, whilst 9 gallons of ordinary diluted butter-milk would be necessary if used as a substitute. Potatoes offer many advantages to pigkeepers when the price is low, like barley and oats; so that nothing better can be done than to feed them. They require to be fed in conjunction with grain, more specially with milk or whey. The best results are obtained by feeding 4 lb. of soaked grain, 4 lb. of skimmed milk, and 3 lb. of potatoes. In food value 4 lb. of potatoes are equivalent to 1 lb. of barley or wheat as a food. Potatoes, although good when fed raw, are improved very much by pulping and cooking. They should always be cooked, and the water from the potatoes should not be used, as the tannin contained in it will coat the stomach, and prevent a free and natural secretion of the digestive fluids. When fed to young pigs, the following rations will be required:—No. 1—Cooked potatoes, 3 lb.; skimmed milk, 10 lb.; or No. 2—Cooked potatoes, 4 lb.; butter-milk, 6 lb.; barley, 1 lb. Sugar beets are preferred by pigs to any other roots. It is not advisable to give them too freely, but they may form a fourth of the ration. Lucerne, tares, and clover are all valuable for grazing, or feeding a little in the sties; but grain must also be given. Molasses is sometimes given to pigs in small quantities, say, 1 lb. per day; its chief value is as an appetiser. Any kind of fruit may be fed, but it must be distinctly understood that grain must also be added. All pigs are the better for a run in a nice, handy, well-grassed paddock of lucerne.

## EARLY MATURITY.

"The secret of producing early pork is to give a liberal allowance of green feed. When fattening for bacon, it is advisable to put pigs in the pen at, say, 5 months old. At this age, if judiciously fed, they will develop into nice-conditioned baconers at 6 to 7 months, and weigh from 120 lb. to 130 lb. dressed. Porkers should weigh 70 lb. to 90 lb., and this weight can be produced at 4 or 5 months, according to breed and feeding. Danish breeders mix their grain as follows:—For pigs up to 4 months old: Mixture, 8 parts of wheat, 8 parts of barley, 1 part of oats. For

pigs over 4 months: Mixture, 14 parts barley, 4 parts wheat, 1 part oats. All the food is soaked and crushed, and green food is supplied at midday. For a sow producing two litters (each of eight suckers) a year, a farmer would require to provide the following amount of food to rear them:—Daily rations for sow carrying litter: 7 lb. to 8 lb. of grain, 1½ gallons separated milk, 5 lb. of good green lucerne. It will take approximately 18 bushels to 20 bushels of grain and 75 gallons of skimmed milk to rear each pig, inclusive of feeding to sow; to rear 16, 36 bushels of grain, 1,250 gallons of skimmed milk, and green feed.

"Daily rations for pigs, supplying all that is necessary for body development and fattening, with skimmed milk not charged up in the costs, include:—No. 1: Daily rations from 2 to 3 months old, 6 lb. of skimmed milk, 1½ lb. of pollard, 1 lb. of barley. The month's total food amounts to 45 lb. of pollard, 30 lb. of barley, and 18 gallons of skimmed milk; total cost, 3s. 5d. No. 2: Daily ration from 3 to 5 months old, 2 lb. of wheat, 2 lb. of barley, 6 gallons of skimmed milk. Total requirements for the two months (60 days), 120 lb. wheat at 3s. per bushel, 150 lb. of barley at 1s. 10d., 36 gallons of skimmed milk; total cost, 11s. 6d. From 5 to 6 months old a daily ration is recommended as follows:—3 lb. of skimmed milk, 2 lb. of wheat, 3½ lb. of barley. This would cost for the month—Wheat, 3s.; barley, 3s. 10d.; with total cost for the month's feeding, 6s. 10d. In the final month (sixth to seventh month) peas may be fed with the ration to top off. Where no peas are grown, feed daily 1½ lb. of wheat, 5½ lb. of barley. With wheat costing 2s. 3d. and barley 6s., the total cost for the month would be 8s. 3d. The total cost of food from weaning to marketing condition would be £1 10s., made up as follows:—Barley, 9 bushels at 1s. 10d. on farm, 16s. 6d.; wheat, 3 bushels 45 lb. at 3s. on farm, 11s. 3d.; pollard, 2¼ bushels at 1s. on farm, 2s. 3d. Where potatoes are low in value or unsuitable for market, they may be fed with much success. A good ration for fattening a pig is 1 gallon of skimmed milk or butter-milk, 4 lb. of soaked barley, and 3 lb. of cooked potatoes. A little green lucerne during the summer, or lucerne hay during the winter, is an excellent food in conjunction with the rations mentioned, varying the quantity from 1 lb. to 3 lb. daily, according to age.

## STUDY MEAT AND FODDER MARKETS.

" It has been shown that one can raise a properly cared for young pig from 2 months of age until ready for market, when 160 lb. live weight, at a cost of 30s. Such a pig would realise from 75s. to 85s., leaving a substantial profit. To dairymen, who can best raise pigs profitably on account of their having skimmed milk, it requires approximately 80 gallons to feed the sow and raise each young pig. Therefore, 1 sow to every 8 cows kept should be a safe margin, or perhaps it would be better to say 1 cow to every sucker. A sow producing two litters of eight in each litter requires the following food daily, when carrying her litter for, say, eight weeks:—6 lb. to 8 lb. of grain, 1½ gallons of skimmed milk, 5 lb. of greenstuff, lucerne, &c. With foodstuffs at present low values, and pigs realising excellent prices, there are great possibilities in pig-raising.

especially in districts where cows are kept as the main source of income. Such a fine source of revenue should not be neglected. In conclusion, it may be said that a liberal feeder may easily let the profits slip through his fingers by keeping his pigs in dirty, draughty, and cold sties; feeding a badly-bred, non-thrifty, long-legged, and unshapely animal; or by irregularity in feeding and careless marketing. When forwarded to market, the pigs should be well protected from the sun and given, if possible, a good hosing with water; this will add to their comfort, and improve their appearance. They should not be travelled upon a full stomach. This caution is especially applicable in hot weather, as it often means the death of one or more. At present values it would be ridiculous to think of exporting. This can only be entertained when values are at a much lower level. The pig business to-day, and, so far as one can foresee into the future, is a most profitable proposition by reason of easy breeding, cheap feeding, and highly remunerative values obtainable at an early age.''—'' The Dairyman,'' Toowoomba.

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## TIMES OF SUNRISE AND SUNSET AT BRISBANE—1914.

| Date. | September. | | October. | | November. | | December. | |
|---|---|---|---|---|---|---|---|---|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. |
| 1 | 6·3 | 5·33 | 5·29 | 5·47 | 4·58 | 6·5 | 4·46 | 6·28 |
| 2 | 6·2 | 5·34 | 5·28 | 5·48 | 4·58 | 6·6 | 4·46 | 6·28 |
| 3 | 6·1 | 5·34 | 5·27 | 5·48 | 4·57 | 6·7 | 4·46 | 6·29 |
| 4 | 6·0 | 5·35 | 5·26 | 5·49 | 4·56 | 6·7 | 4·46 | 6·30 |
| 5 | 5·59 | 5·35 | 5·25 | 5·49 | 4·56 | 6·8 | 4·46 | 6·31 |
| 6 | 5·58 | 5·36 | 5·24 | 5·50 | 4·55 | 6·9 | 4·46 | 6·31 |
| 7 | 5·57 | 5·36 | 5·23 | 5·50 | 4·54 | 6·9 | 4·46 | 6·32 |
| 8 | 5·56 | 5·37 | 5·21 | 5·50 | 4·54 | 6·10 | 4·46 | 6·33 |
| 9 | 5·54 | 5·37 | 5·20 | 5·51 | 4·53 | 6·11 | 4·46 | 6·33 |
| 10 | 5·53 | 5·37 | 5·19 | 5·52 | 4·52 | 6·11 | 4·47 | 6·34 |
| 11 | 5·52 | 5·38 | 5·18 | 5·52 | 4·52 | 6·12 | 4·47 | 6·35 |
| 12 | 5·51 | 5·38 | 5·17 | 5·53 | 4·51 | 6·13 | 4·47 | 6·36 |
| 13 | 5·50 | 5·39 | 5·16 | 5·53 | 4·51 | 6·14 | 4·47 | 6·36 |
| 14 | 5·49 | 5·39 | 5·15 | 5·54 | 4·50 | 6·14 | 4·48 | 6·37 |
| 15 | 5·48 | 5·40 | 5·14 | 5·54 | 4·50 | 6·15 | 4·48 | 6·37 |
| 16 | 5·46 | 5·40 | 5·13 | 5·55 | 4·49 | 6·16 | 4·48 | 6·38 |
| 17 | 5·45 | 5·41 | 5·12 | 5·56 | 4·49 | 6·17 | 4·48 | 6·39 |
| 18 | 5·44 | 5·42 | 5·11 | 5·56 | 4·49 | 6·18 | 4·49 | 6·39 |
| 19 | 5·43 | 5·42 | 5·10 | 5·57 | 4·48 | 6·18 | 4·49 | 6·40 |
| 20 | 5·42 | 5·42 | 5·9 | 5·57 | 4·48 | 6·19 | 4·50 | 6·40 |
| 21 | 5·41 | 5·42 | 5·8 | 5·58 | 4·47 | 6·20 | 4·50 | 6·41 |
| 22 | 5·40 | 5·43 | 5·7 | 5·58 | 4·47 | 6·21 | 4·51 | 6·42 |
| 23 | 5·38 | 5·43 | 5·6 | 5·59 | 4·47 | 6·22 | 4·51 | 6·42 |
| 24 | 5·37 | 5·44 | 5·5 | 6·0 | 4·47 | 6·22 | 4·52 | 6·43 |
| 25 | 5·36 | 5·44 | 5·4 | 6·0 | 4·47 | 6·23 | 4·52 | 6·43 |
| 26 | 5·35 | 5·45 | 5·4 | 6·1 | 4·46 | 6·24 | 4·53 | 6·43 |
| 27 | 5·34 | 5·45 | 5·3 | 6·2 | 4·46 | 6·25 | 4·53 | 6·44 |
| 28 | 5·33 | 5·46 | 5·2 | 6·2 | 4·46 | 6·25 | 4·54 | 6·44 |
| 29 | 5·32 | 5·46 | 5·1 | 6·3 | 4·46 | 6·26 | 4·54 | 6·44 |
| 30 | 5·30 | 5·47 | 5·0 | 6·4 | 4·46 | 6·27 | 4·55 | 6·45 |
| 31 | ... | ... | 4·59 | 6·5 | ... | ... | 4·56 | 6·45 |

**PHASES OF THE MOON.**

| | | H. | M. | |
|---|---|---|---|---|
| 5 Sept. | ○ Full Moon | 12 | 1 | a.m. |
| 13 ,, | ☽ Last Quarter | 3 | 48 | ,, |
| 20 ,, | ● New Moon | 7 | 33 | ,, |
| 26 ,, | ☾ First Quarter | 10 | 3 | p.m. |
| 4 Oct. | ○ Full Moon | 3 | 59 | p.m. |
| 12 ,, | ☽ Last Quarter | 7 | 33 | ,, |
| 19 ,, | ● New Moon | 4 | 33 | ,, |
| 26 ,, | ☾ First Quarter | 8 | 44 | a.m. |
| 3 Nov. | ○ Full Moon | 9 | 49 | a.m. |
| 11 ,, | ☽ Last Quarter | 9 | 37 | ,, |
| 18 ,, | ● New Moon | 2 | 2 | ,, |
| 24 ,, | ☾ First Quarter | 11 | 39 | p.m. |
| 3 Dec. | ○ Full Moon | 4 | 21 | a.m. |
| 10 ,, | ☽ Last Quarter | 9 | 32 | p.m. |
| 17 ,, | ● New Moon | 12 | 35 | ,, |
| 24 ,, | ☾ First Quarter | 6 | 25 | ,, |

# Poultry.

## REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, AUGUST, 1914.

Five thousand seven hundred and sixty-six eggs were laid during the month; an average of 144 per pen. The birds are now doing good work, all being now over the moult, with the exception of one of J. M. Manson's, which is in heavy moult. T. Fanning's Black Orpingtons win the monthly prize with 165 eggs. The following are the individual records:—

| Competitors. | Breed. | August. | Total. |
|---|---|---|---|
| T. Fanning | White Leghorns | 131 | 610 |
| Kelvin Poultry Farm | Do. | 141 | 583 |
| A. T. Coomber | Do. | 143 | 571 |
| Moritz Bros., S.A. | Do. | 152 | 520 |
| Loloma Poultry Farm, N.S.W. | Do. | 154 | 515 |
| Loloma Poultry Farm, N.S.W. | Rhode Island Reds | 152 | 511 |
| R. Burns | Black Orpingtons (No. 1) | 162 | 492 |
| J. T. Coates | Do. | 142 | 484 |
| Geo. Tomlinson | White Leghorns | 159 | 482 |
| J. P. Wilson | Do. | 124 | 472 |
| Cowan Bros., N.S.W. | Do. | 154 | 466 |
| R. Burns | S. L. Wyandottes | 162 | 462 |
| E. Le Breton | White Leghorns | 160 | 445 |
| R. Jobling, N.S.W. | Do. | 140 | 441 |
| A. F. Camkin, N.S.W. | Do. | 145 | 442 |
| G. E. Austin | Do. | 132 | 440 |
| Mrs. Bieber | Brown Leghorns | 142 | 439 |
| J. Gosley | White Leghorns | 135 | 438 |
| R. Burns | Black Orpingtons (No. 2) | 153 | 438 |
| J. D. Nicholson, N.S.W. | White Leghorns | 131 | 432 |
| A. H. Padman, S.A. | Do. | 159 | 425 |
| E. V. Bennett, S.A. | Do. | 151 | 422 |
| J. Franklin | Do. | 155 | 422 |
| Mrs. Munro | Do. | 153 | 416 |
| J. Manson | Do. (No. 1) | 139 | 414 |
| T. Fanning | Black Orpingtons | 165 | 414 |
| J. T. Coates | White Leghorns | 141 | 411 |
| Marville Poultry Farm, Victoria | Do. | 148 | 407 |
| J. Kilroe | Do. (No. 1) | 119 | 405 |
| Derrylin Poultry Farm | Do. | 144 | 402 |
| F. McCauley | Do. | 142 | 400 |
| J. Kilroe | Do. (No. 2) | 134 | 392 |
| D. Moreton | Do. | 140 | 388 |
| Range Poultry Farm | Do. | 148 | 375 |
| J. Zahl | Do. | 140 | 373 |
| Mrs. Bradburne, N.S.W. | Do. | 135 | 372 |
| J. N. Waugh, N.S.W. | Do. | 125 | 365 |
| C. M. Jones | Do. | 144 | 342 |
| J. M. Manson | Do. (No. 2) | 128 | 318 |
| J. Murchie | Brown Leghorns | 139 | 318 |
| Total | ... | 5,766 | 17,464 |

## THE COMMERCIAL SIDE OF POULTRY KEEPING.

To rear poultry as an adjunct to dairy-farming, pig-breeding, or market gardening is one thing. To rear poultry for profit on a poultry farm is quite another proposition. The Rev. T. W. Sturges, M.A., discussing this matter in his exhaustive work on poultry, says that poultry keeping as a hobby is a delightful occupation, and to the vast multitudes who undertake it for this end is due the fact that it may sometimes be made a commercial success. There is no reason why anyone of average intelligence should not make his poultry repay him for the trouble bestowed. But to make it the sole business of life from which the maintenance of a man and his family may be derived, is quite another matter. To look upon the calling as a sort of oasis in the desert—an Arcadia of life, where fruits grow without the planting or watering—is little short of a delusion. Many have made a shipwreck of their hopes in attempting it; of the many who have tried it none have found it to answer, or, if any have done so, they have kept the fact a profound secret. That the small farmer who keeps twenty or thirty head of poultry has found it reasonably profitable is no answer to the question. The food bill on a farm is small, and the garden and house scraps supply the bulk of it. The case is very different with the poultry farmer pure and simple. His expenses are heavy for feed, housing, transport, &c. There are delusive books—fairy tales which narrate such easy problems as: "If 4 hens cost £1 a year to keep, and lay eggs, which, at 1d. each, bring in £2, or £1 profit, then 400 hens will bring in £100, and 4,000 hens £1,000"; and so on. Other misleading statements are based on a single hen bringing in 30s. a year! Multiply this by 200, and you have £300 a year. All you need for this is a cottage and a couple of acres of land, since every hen will lay in the winter 100 eggs, which sell at 2s. a dozen; and those she lays and hatches in the summer will find a ready sale as day-old chicks at a guinea a dozen, &c., &c. When a new breed shall have been discovered with a clockwork interior which needs only a yearly winding up, and is guaranteed to keep time, then "success will be certain." Meanwhile, we wait!

If these schemes were practical on a colossal scale, millionaires would be as plentiful as blackberries in autumn. Mr. Sturges puts it down as a very good average result that, if a poultry farmer on this system gets 5s. per head, he is doing well. And if he has 400 birds to look after, and has to raise his yearly flock of chickens to replace the old ones, he will be fully occupied. Where one man does this, seventy fail to do so; most who have tried it have to be content with less, and very many have failed to make both ends meet. But, it will be said, "There are poultry farmers who earn a good livelihood." The answer is, "Yes, there are many who do so, but it is not by such methods." These are men who have made a study of the business, and have not taken to it because they have failed at everything else. They have either served an apprenticeship to the business with those who have already been successful, or have served the longer apprenticeship of experience.

The people who make a good livelihood out of poultry farming are not those who keep hens simply to supply the table with fresh eggs and dead poultry, but those who breed purebred poultry of the more popular

breeds and varieties and sell the eggs for hatching purposes, and raise stock and sell them to others for breeding or for exhibition, or exhibit the birds in their own names.

Mr. Sturges divides these roughly into two classes—(1) Those who breed chiefly for exhibition purposes, and by means of advertising and exhibiting their stock, get enhanced prices for them, as well as high prices for the eggs they sell for hatching. (2) Those to whom exhibiting is only a minor part, but who breed high-class stock, and sell a great number of both for breeding and for laying to the very large number of patrons who like to see purebred stock about them. It is entirely due to the fancier that we have breeds and varieties of fowls that will lay from 150 to 180 eggs or more a year. The absolute mongreldom which still prevails on the average farm homesteads, as well as in the cities and suburbs, would have been universal had it not been for the fancier and his carefully selected stock.

As far as eggs for the markets is concerned, there is an unlimited demand all over the State. Grocers and other tradesmen who sell them are always willing to buy and pay fair prices for clean, fresh-laid eggs, prices fluctuating, of course, according to the season of the year.

## LEGHORN-ORPINGTON.

"Here is an interesting item about breeding," says an Exchange: "Say you have some Black Orpington hens that turned into lay when they were eight months old. If you put a Leghorn cock with these hens, the crossbred pullets will turn into lay at six months, and they will be shapely birds—a cross between the neat, clean-cut Leghorn and the bulky Orpington. In fact, also, the crossbreeds will all be white with the exception of a few black splashes and spots here and there that will show up on some, but most of them will be all white. The Orpington is practically rubbed out in the combination excepting that most of the crossbred pullets will become broody, same as their mothers, and the eggs will be tinted. They won't be white-shelled like those of the Leghorns, nor a rich brown like those of the Orpingtons.

"Another breeding 'tip': 'Do what you will you can't breed out the rose comb,' says the same writer. 'You may go in for as many crosses or combinations with single breeds as you like, but when the rose comb once gets in, it is there to stay, and it will pop up for all time afterwards. Not every year, may be, but it will show up every now and again, and you will never breed it out. You know the Dorking has five toes? Well, the same remarks apply—once you get the five toes into a strain you will never breed it out.'

"You will Never Breed out the Rose.—That seems to us quite a mild way of putting it. If strong brown egg swamps weak white egg, strong broody swamps non-broody, strong white colour swamps weak black, strong Leghorn type swamps weak Orpington type, strong early laying swamps weak late laying, strong normal toe swamps weak fifth toe, why does not strong rose comb swamp weak single comb? The

answer, of course, is that man protects the weak single by selection. In nature, or in any unselected yard the strong rose would not only keep popping up casually but it would do so continually to the extent of three-quarters of the whole. The facts mentioned are interesting and important in their teaching, so our contemporary must forgive our collaring his text to preach a different sermon on. Those results of crossing are, as we said, interesting. The reason why they occur is, we think, equally so.

"In passing, we would point out the clear distinction between strength and weakness, dominance and non-dominance brought out throughout. There is evidently some underlying reason which is common to all those contrasting characters. What applies to one will probably apply to all. We see evidence of marked dominance in early laying and conversely marked non-dominance in late laying; also what may be called an intermediate state in the case of the strong brown and the weak white which become tinted.

"Never is quite a long while; but when we read that 'do what you will you will never breed out the rose,' our first thought was one of sorrow for the many misguided people who think they can. What sad mistakes you have made! When we remembered the immense amount of evidence and experimental work they had backed their opinion with, we mentally add 'unless you know how' to the heading of this paragraph.

"The Rose and Single Comb is not of itself of any great importance, but its evidence to animal breeders is what the tall and dwarf sweet pea is to plant breeders, one of the chief corner stones of the new gospel. Further, from the poultryman's point of view, if these men are correct in their theory and evidence of comb formation, may they not be correct in their interpretation of some or all the other contrasting characters mentioned. We see great similarity of effect; may we not deduce similarity of cause. If it can be shown that a strong character like rose and a weak character like single can be bred in or out at will, may we not hope that broodiness, shell tint, age of laying and character of laying may, by the same procedure, be likewise bred more in accordance with the breeders' wishes and expectations than is the case at present. That such may be and probably is a fact has, in many cases, been demonstrated beyond question, is our excuse for the above and succeeding paragraphs.

"Let us mate a 'pure' R.C. male with a pure S.C. female, or the reverse, and we get all R.C. chicks. This is a question of fact—of common experience. Why did we get them? Because the R.C. character is stronger than the S.C. character. These chicks are the first generation. At this point it is interesting to ask whether the S.C. character has been wiped out of the constitution of these first generation chicks. It certainly looks like it, for though they may not all be perfect R.C.'s, they will be R.C.'s and none will be S.C.'s. The combs, like the birds themselves, will be crossbreds. The answer to the question we have asked is—No. That is theory. It can be proved by mating any two of these first generation birds together, for they will give you R.C.

and S.C. chicks. It is evident, then, that the S.C. character either skipped a generation, which implies that it came from nothing in these chicks or that the character was hidden—present but not expressed in bodily form. As you cannot create something from nothing the latter must be accepted as the correct explanation. In other words, they will have a character for R.C., which is shown, and a character for S.C., which is not shown.

" The explanation is that the germ cells (gamates or marrying cells) which came from the R.C. parent male had the R.C. character, and the germ cells which came from the S.C. female parent had the S.C. character. In fertilisation, which is the union of whatever characters came from the male with whatever characters came from the female, they met in the eggs which, when hatched, produced these first generation chicks. As we have seen the R.C. character is stronger than the S.C. character, so the former was shown, the latter hidden. That seems simple so far. The R.C. character in each chick is accounted for and the hidden presence of the S.C. in each chick explained. That ends the first generation and we are left with a yard full of R.C.'s.

" The question now comes—Do we want to breed R.C. or S.C. birds? The procedure in either case is the same. All these chicks now grown into adults are exactly the same as to comb, so we take any male or several males and mate them with one or several females. What would happen? As we already know, we should get R.C. and S.C. chicks (second generation) because they (the parents) all have R.C. and S.C. characters in their constitution—that is, they are really crossbred or hybrid for comb formation.

" What happened was this: The male contributed R.C. and S.C. to the marrying cells he formed, not both to each cell but Rose to half and Single to half. The female contributed R.C. and S.C. to the marrying cells she formed on the same terms. When these marrying cells met in fertilisation—that is, in the eggs which produced this second generation —there were four possibilities—

" 1. R.C. from a marrying cell from the male met R.C. from a marrying cell from the female; or,

" 2. R.C. from a marrying cell from the male met S.C. from a marrying cell from the female; or,

" 3. S.C. from a marrying cell from the male met R.C. from a marrying cell from the female; or,

" 4. S.C. from a marrying cell from the male met S.C. from a marrying cell from the female.

" So out of every four eggs we get—

" 1. A chicken which gets R.C. from the union of two marrying cells, both of which carried R.C. but not S.C. It is a ' pure ' R.C., and will, when mated with any other ' pure ' R.C., give ' pure ' R.C. chicks. Why shouldn't it? There is no hidden S.C. in its constitution.

" 2. A chicken which gets R.C. from the union of two marrying cells, one of which carried R.C. and the other S.C., R.C. is stronger than S.C., so it is ' impure ' R.C.—*i.e.*, though R.C. is shown S.C. is present but hidden. Consequently this chick cannot be depended on to throw

either all R.C.'s or all S.C.'s. It will throw both, either with 'pure' R.C.'s or 'pure' S.C.'s or with birds of its own constitution.

"3. A chicken which gets S.C. from the union of two marrying cells, one of which carried S.C. and the other R.C. It is of exactly the same constitution as No. 2 and of the same breeding value.

"4. A chicken which gets S.C. from the union of two marrying cells, which carried S.C. but not R.C. It is 'pure' S.C., and will, when mated with any other 'pure' S.C., give 'pure' S.C. chicks. Why shouldn't it? There is not a trace of R.C. in its constitution. In this case there is no strong R.C. to hide, mask, or suppress it. All things are possible, but there seems about as much chance of a bird so bred throwing R.C. chicks as there is of the millenium."

# Statistics.

## RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF AUGUST IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING AUGUST, 1913 AND 1914, FOR COMPARISON.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|
| | Aug. | No. of Years' Records. | Aug., 1914. | Aug., 1913. |
| *North Coast.* | In. | | In. | In. |
| Atherton ... ... | 0·91 | 13 | 1·18 | 0·03 |
| Cairns ... ... | 1·48 | 27 | 4·93 | 0·18 |
| Cardwell ... ... | 1·16 | 27 | 1·19 | Nil |
| Cooktown ... ... | 1·28 | 27 | 7·22 | 0·03 |
| Herberton ... ... | 0·65 | 27 | 1·10 | Nil |
| Ingham ... ... | 1·44 | 22 | 0·54 | 0·04 |
| Innisfail ... ... | 5·30 | 27 | 10·53 | 0·91 |
| Mossman ... ... | 1·58 | 5 | 2·36 | 0·47 |
| Townsville ... ... | 0·40 | 30 | 0·03 | Nil |
| *Central Coast.* | | | | |
| Ayr ... ... ... | 0·40 | 27 | Nil | Nil |
| Bowen ... ... | 0·68 | 27 | 0·09 | Nil |
| Charters Towers ... | 0·44 | 27 | Nil | Nil |
| Mackay ... ... | 1·19 | 27 | 0·32 | Nil |
| Proserpine ... ... | 0·77 | 11 | 2·13 | Nil |
| St. Lawrence ... | 1·15 | 27 | 0·28 | Nil |
| *South Coast.* | | | | |
| Crohamhurst ... | 2·37 | 20 | 2·07 | 0·06 |
| Biggenden ... ... | 1·27 | 14 | 0·44 | 0·02 |
| Bundaberg ... ... | 1·56 | 27 | 0·36 | 0·02 |
| Brisbane ... ... | 2·28 | 63 | 0.29 | 0·02 |
| Childers ... ... | 1·33 | 19 | 0·84 | Nil |
| Esk ... ... ... | 1·75 | 27 | 0·24 | Nil |
| Gayndah ... ... | 1·22 | 27 | 0·16 | Nil |
| Gympie ... ... | 1·65 | 27 | 1·31 | 0·08 |
| Glasshouse M'tains | 1·72 | 6 | 1·13 | Nil |
| Kilkivan ... ... | 1·42 | 27 | Nil | Nil |
| Maryborough ... | 1·59 | 27 | 1·62 | Nil |

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|
| | Aug. | No. of Years' Records. | Aug., 1914. | Aug., 1913. |
| *South Coast—continued:* | In. | | In. | In. |
| Mount Larcom ... | ... | ... | 1·3 | ... |
| Nanango ... ... | 1·55 | 27 | 0·18 | 0·09 |
| Rockhampton ... | 0·97 | 27 | Nil | Nil |
| Woodford ... ... | 2·05 | 27 | 0·89 | Nil |
| Yandina ... ... | 2·18 | 21 | 1·72 | Nil |
| *Darling Downs.* | | | | |
| Dalby ... ... | 1·26 | 27 | 0·39 | Nil |
| Emu Vale ... ... | 1·36 | 17 | 0·17 | Nil |
| Jimbour ... ... | 1·41 | 24 | 0·37 | Nil |
| Miles ... ... | 1·23 | 27 | Nil | Nil |
| Stanthorpe ... | 1·72 | 27 | 0·31 | Nil |
| Toowoomba ... | 1·89 | 27 | 0·44 | Nil |
| Warwick ... ... | 1·59 | 27 | 0·15 | Nil |
| *Maranoa.* | | | | |
| Roma ... ... | 1·04 | 25 | Nil | Nil |
| *State Farms, &c.* | | | | |
| Gatton College ... | 1·49 | 14 | 0·25 | Nil |
| Gindie ... ... | 1·74 | 13 | Nil | Nil |
| Kamerunga Nurs'y | 1·54 | 23 | 3·49 | 0·27 |
| Kairi ... ... | ... | ... | 2·24 | 0·18 |
| Sugar Experiment Station, Mackay | 0·84 | 16 | 0·21 | Nil |
| Bungeworgorai ... | ... | ... | Nil | Nil |
| Warren ... ... | ... | ... | Nil | 0·17 |
| Hermitage ... | 1·90 | 7 | Nil | Nil |

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for August this year and for the same period of 1913, having been compiled from telegraphic reports, are subject to revision.

# State Farms.

## BUNGEWORGORAI.

Report for the month ending 13th September, 1914.

*Meteorological.*—Dry conditions have prevailed, as during the past seven weeks only 2 points of rain have been recorded. At time of writing there are favourable indications of a break, isolated showers having been noticed falling during the past few days in the surrounding districts. Maximum temperature recorded was 80 degrees; average, 71·5. Minimum temperature, 34 degrees; average, 46·3. Rainfall, 2 points.

*Winter Cereals.*—Despite the unfavourable but not unseasonable dry spell (August having proved to be the driest month here during the past 30 years), the crops look well, more especially the early ones, which in some instances should be fit to harvest in five or six weeks. As a result of this season's operations, many varieties grown for a number of seasons past in blocks will in future be confined to drills only.

*Vineyard.*—The advent of the warmer weather has resulted in the earliest of the varieties of vines being at the present time sufficiently advanced to enable disbudding being carried out.

*Orchard.*—All the citrus fruits are blossoming very freely. Apricots, plums, peaches, &c., are in flower, and a fair crop of fruit should result, given suitable weather conditions.

*Summer Crops.*—With the exception of a few melons, marrows, &c., no sowings have as yet been made of these. The reason for this is owing to the fact that upon completing sowing of winter cereal crops other work occupied the attention of the teams, thereby preventing early preparation of seed-beds in sufficient time to derive benefit from rains experienced in the latter part of July. All the available suitable land (28 acres) has been worked up, and only awaits sufficient rain to enable it to be brought to the desired condition for sowing.

*Grass.*—Rhodes grass on the light country still keeps on growing, and, where sheltered, has grown continuously throughout the winter.

*Stock.*—All the live stock at this institution look well. The horses, which have been working continuously since last February, are in good condition, though a spell would no doubt do them good.

*General.*—The round timber for the additions to the hayshed and stables has been secured, and the cutting and drawing of the material for a crush and yard are being gone on with. Visitors, as is usual at this period of the year, are becoming more numerous, this being the most suitable period for persons interested in wheat culture to visit this institution.

The manager of the State Farm, Roma, reports as follows for the month of August, 1914:—

*Meteorological.*—Dry weather has prevailed since forwarding previous report. In the early part of the month frosts were experienced, whilst during the latter portion summer-like weather has prevailed. The maximum temperature recorded was 78 degrees; average, 70·8. Minimum temperature, 32 degrees; average, 40·4. Rainfall, nil.

*Crops.*—Winter cereals: These, on the whole, look exceptionally well, though traces of rust are to be met with in the most forward crops. Rain, though not urgently necessary, would considerably improve the prospects if experienced within the next fortnight. The early-sown early-maturing varieties, which cover an area of approximately 27 acres, are well out in ear, and have in some instances been so for three weeks.

*Summer Crops.*—The land is in the course of preparation for these. The area intended for spring sowing awaits rain to put it in the desired condition.

*Orchard.*—The pruning of the deciduous trees has been accomplished some time. Early varieties of peaches, apricots, &c., are in full bloom.

*Vineyard.*—Some of the early varieties are coming away strongly.

Both the orchard and vineyard have been ploughed, cultivated, and harrowed during the period under review.

*General.*—The live stock look well, there being a little herbage in addition to the dry grass on the flat country, which no doubt accounts for the fact. Nevertheless, rain is required, as the dry feed is becoming scarce. A few applications have been received for "Teff grass" seed and "Earth nuts," which have been supplied. The round timber for the hayshed additions has been obtained, and 13 of the 20 required for the stables as well. All necessary work, such as chaffcutting, chipping, &c., has been carried out as the opportunities to do so presented themselves.

## WARREN.

Report for the month of August:—

Weather conditions for the month of August proved very dry, no rain having fallen. Farmers round this district are suffering badly for want of rain, most of the pastures affording very little fodder for stock.

The chief operations on this farm at present are prickly-pear eradication, land-clearing, and harvesting of the winter cereals. This farm is the only one in the district with a crop growing on forest country in spite of adverse weather conditions, clearly showing what proper cultural operations mean in order to secure a good crop. The conservation of moisture in the soil by means of proper cultivation is a subject to which most of our farmers pay insufficient attention.

The results of this year's winter crop are shown as follows:—

*Californian Feed Barley.*—This was sown on the 27th March, under favourable conditions, at the rate of 48 lb. of seed per acre. The crop

thrived well in its early stages, but during dry weather was checked in growth considerably. This was due to the shallow rooting habits of the plant, the rootlets not reaching deep enough to obtain moisture. The ears filled well, the grain being large and plump. Feed barley is not recommended for this district, the weather conditions being much too severe.

*La Huguenot Wheat.*—This wheat was planted on the 28th March under favourable conditions. La Huguenot is a wheat of the macaroni type, being a selection from Bald Medeah. It is essentially a hay wheat, the grain being much too poor and unsuited for milling purposes. Unless planted very thickly, it grows very coarse and rank, but when sown at the rate of 68 lb. per acre, as was done here, it makes an excellent hay crop. This variety proved excellent for this district, standing dry weather, and showing no signs of rust. The flag was thick, but on the coarse side. The yield per acre was very heavy, and the heads well filled with grain.

*"Thousandfold" Rye* was planted on the 4th April. This received little rain, but grew luxuriantly, attaining the average height of 5 ft. The grain was well filled, but the flag on the stalks was very thin. Rye grows well in this district on practically any class of land.

*Famer's Durum Wheat* was sown on the 25th April, and grew well. The flag was very thick and fine, and the heads filled well. This is a bearded wheat of the macaroni type, and is suited to our dry conditions, but on account of the awns, which are detrimental to first-class hay, will not be grown largely nor be favoured here.

*Kubanka*, another bearded wheat, was sown on the 25th April, and thrived well under dry conditions, but did not attain much height. Flag nice, bright, and clean, and heads well filled with good grain. This variety was slightly affected with rust and smut.

*Cedar and Zealand Wheats* were sown fairly late in the season, and, owing to exceptionally dry weather, did not come to much.

Wheats are grown here for hay only. It is found that the milling wheats do not grow well, the grain being very pinched and the crop affected by rust.

Clearing operations are still being carried on with the aid of high-power explosives. Demonstrations have been given to different farmers to show the value of this cheap and effective way of clearing land.

Dairying operations have resulted in an increased supply of cream for the factory. The cows have been grazed on wheat and lucerne, and, as a result, the milk supply has materially increased. The natural pastures are now too dry for dairy cows, but afford plenty of feed—sufficient to keep all the stock in their usual splendid condition.

Cultural operations are being carried out, and a prosperous summer season is looked forward to.

[Photographs showing wheat crops and harvesting operations arrived too late for insertion in this issue, but will appear in the Journal for November, meanwhile they will be utilised in the Annual Report of the Department.—Ed. "Q.A.J."]

The Manager (Mr. T. Jones) supplies the following information in connection with the live stock on the farm:—

The horse season has now commenced, and people may wish to know the pedigree of our Clydesdale horse.

PEDIGREE OF CLYDESDALE STALLION, "SIR GEORGE," (1295), New Zealand Draught Horse Stud Book; also entered in forthcoming volume of New Zealand Clydesdale Horse Society's Stud Book. *Foaled*: 12th December, 1910. *Bred by* Mr. Thos. Blackley, Riverina, Rakia, Canterbury, New Zealand. *Sire*: Sir Talbot (11544), by Lothian's Best (10374); dam, Cherry Ripe (14414), by Royal Signet (8967); 2nd dam, Cherry Bud, by Knight Errant (4483); 3rd dam, Young Cherry of Culdees (9133), by Sir Gordon (4018); 4th dam, Cherry of Culdees (2984), by St. Colme (7383); 5th dam, by Lochbrow (2225). *Dam*: Burnside Primrose VI. 1159, N.Z.S.B.), by Marshall Keith (7046); 2nd dam, Primrose (564), by Roseberry (780) or Elgin (117); 3rd dam, Emma by Darnley (222); 4th dam, by Young Campsie. Sir Talbot was bred by R. T. N. Speir, of Culdees, Muthhill, Perthshire; and was imported by the New Zealand Government. His sire, Lothian's Best, was bred by Messrs. R. and R. Percival, Burgh-by-Sands, Carlisle; and was by Lord Lothian (5998); dam, Flash Girl (13233), by Flashwood (3604); granddam, Luna (7357), by The Maister (1840); great granddam, Cause Way End Jean (790), by Emperor, by Comet (195); g.g. granddam Jess, by Defiance (225). Burnside Primrose VI. was bred by the late Wm. Boag, of Burnside, Canterbury, New Zealand. Her sire (Marshall Keith) was bred by Mr. James Argo, Crannabog, Rothie Norman, Aberdeenshire, and was by McCamon (3818), by Blue Ribbon (1961); dam, Darling II. (4378), by Ivanhoe II. (399).

The following information may also be of interest to Ayrshire breeders:—

Our champion Ayrshire dairy bull, "Spectator," died on the 1st of May last; and we were left without a matured sire in our Ayrshire stud. However, a young bull of good pedigree had been well reared, and reserved for home use. This one I have named "Noami's Arthur." His sire is Arthur Lytton; sire of sire, Auclaubrain Arthur, 7535, A.H.B. of S.; dam of sire, Tower Bess 4th, 25969, vol. 34, A.H.B. of S. His dam is Naomi of Wanora; sire of dam, Speculation or Whitehill (imp.); dam of dam, Ruth, No. 178, Q.D.H.B.; granddam of dam, Ream Ruthie of Glen Elgin, by Gordon.

Tower Bess 4th was one of the heifers purchased in Scotland by the late Principal of Gatton College.

I have received some tempting offers for this young bull, but thought it would be wise to keep him for home use.

Breeders will kindly note the new blood introduced by using this bull.

Plate 67.—"Sir Hugh," Champion Ayrshire Bull of Scotland.
The Property of James Howie, Esq., Kilmarnock.

## ERADICATING WATER WEEDS FROM IRRIGATING DITCHES.

Discing canals while the water is running is reported as a successful means of eliminating growth of water weeds in the Bear River and Cache Valley projects in California. An ordinary disc harrow is stripped of its seat and double trees and the tongue is cut 4 ft. in length. To this are hitched two ropes, leading to teams, one on each bank; by adjusting the length of these ropes the harrow can be run on either slope or on the bottom. This digs up the roots and the plants float down and are removed. The above canals were very foul three years ago when Mr. Whelan, the manager, introduced this system; now very few weeds are left. It is cheaper than mowing, and it does not interrupt the flow of water.—"Monthly Bulletin."

[Many of the bore drains in our Western country are choked with bulrushes. The above suggests that it would not be difficult to eradicate them.—Ed. "Q.A.J."]

# The Orchard.

## ORANGES AT CLERMONT.

We have previously had occasion to make mention of the suitability of the Clermont district for the production of citrus fruits, and our illustration and description of oranges grown at the Racecourse Garden by Mr. G. Barraclough bears out this opinion. The fruit was exhibited at the Clermont Show in June last. On the upper right hand side of the photograph is a bunch of the well-known Glen Retreat mandarin, alongside another bunch of six of which the grower does not know the name. The trees producing the latter were grown from seed sown thirty-five years ago. All that can be said about them is that they are some of the finest oranges he has ever seen, having a pineapple flavour. There are 500 of these trees in the grove, and these are said to be the pick of them. All have been irrigated by steam power, and, in spite of a very dry year, the Glen Retreats are the best ever produced on the property. The mandarins averaged 10½ in. in circumference, and the oranges 11½ in., some being somewhat larger, but none smaller.—[The unnamed oranges may be Grape fruit.—Ed. "Q.A.J."]

## HOW TO KEEP ORANGES FOR SUMMER USE.

Mr. Geo. Quinn, the Government Fruit Expert, South Australia, gives the following instructions for keeping oranges for summer. Mr. Quinn has kept them for months by the following plan:—"First, you must select good fruit on the tree, and cut it carefully, leaving a piece of the stem on the fruit. The rind must not be even scratched. Place the fruit in a room on a table or shelf where it will get plenty of fresh air, but not a draught, for a few days, so that the rind may toughen. Then get a shallow box, say a foot deep, and put a layer of bran on the bottom. Wrap tissue paper around each orange and place them about an inch apart. Put another layer of bran on, and another layer of fruit, and so on. Keep the box in a cool cellar, and if the atmosphere is moderately moist the fruit will remain fresh and good for a long time. Should the atmosphere become dry, a little water should be put on the floor, and the evaporation would produce the necessary moisture. Excellent results can be assured by the use of fine dry sand, but I have found that bran is better, because it is not so heavy. Lemons can be treated in the same way, but they will keep for a year if merely wrapped in tissue paper and put on a shelf in a cool cellar."

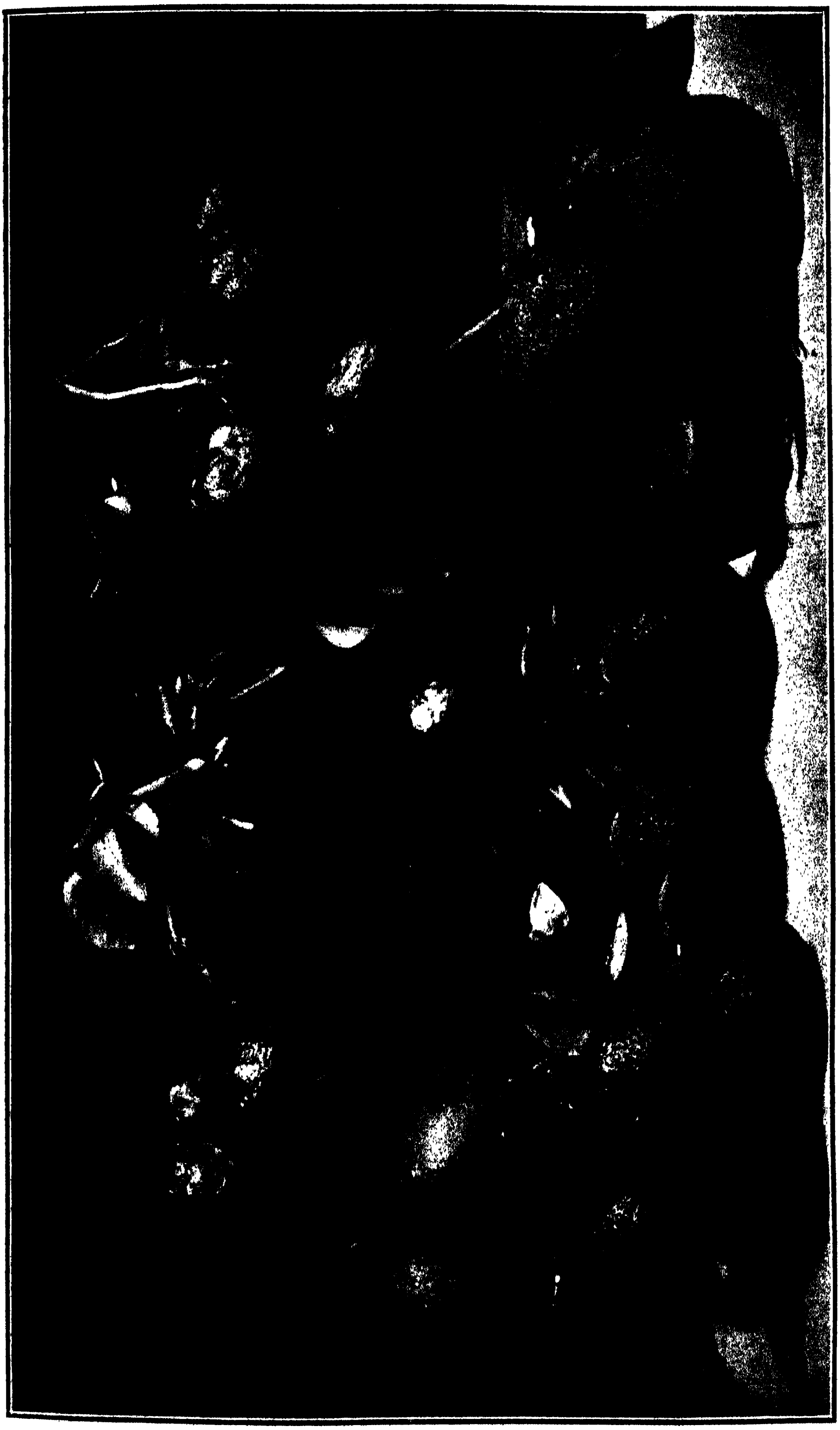


Plate 68.—Oranges and Grape Fruit Grown at Clermont by Mr. G. Barraclough.

## MANURING PINEAPPLES.

Mr. F. Fairley, who grows a considerable area (26½ acres) of pineapples at Woombye, has studied the subject of fertilisers for this class of fruit, and, in order to save time and ensure accuracy, has designed a chart for his own use; and, believing that it might be of service to other

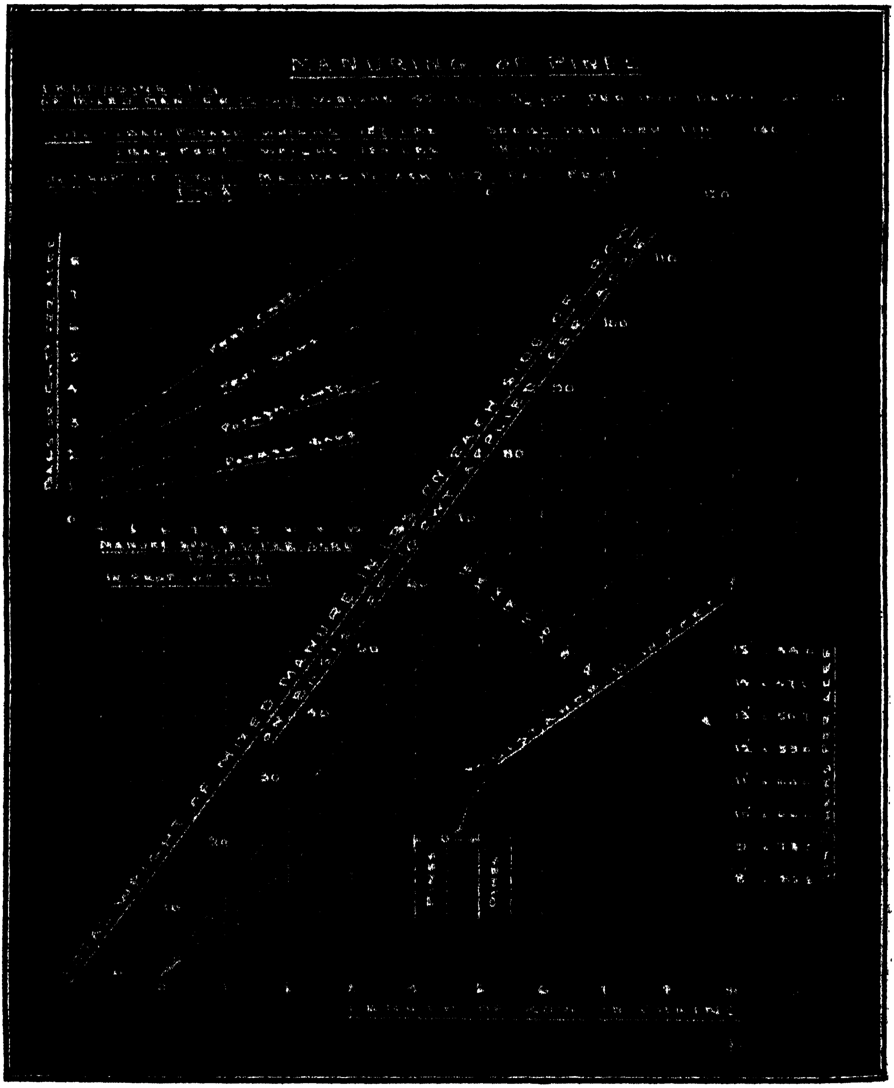


PLATE 69.—CHART FOR MANURING PINEAPPLES.

pineapple-growers, he has forwarded us the illustration herewith. It gives all the necessary data required, and the following explanation of how to use the chart should prove of interest and value to others engaged in the same branch of fruitgrowing:—

## EXPLANATION OF CHART.

The quantity of manure to be applied to each side of a row of pineapples, in order to give them a given dressing in cwts. per acre, depends upon the distance the rows are apart.

Therefore, measure the distance in feet from the inside of one row over the top of the pines to the next row, as per diagram on chart.

Supposing this distance (D) is found to be 12 ft. and the average length of rows to be manured is 5 chains, run the eye up from 5 chains at bottom of chart until the 12-ft. diagonal line is met, and at right angles to this it is seen that 51 lb. of mixed manure must be applied to each side of a row on the basis of 10 cwt. per acre. If 7 cwt per acre is to be applied, take seven-tenths of this amount, *i.e.*—51 x .7 = 35.7 lb. If 12 cwt. per acre, 1·2 x 51 = 61·2 lb. on each side of row.

If it is required to know what quantity of manure should be ordered for a given patch of pines—supposing as above the distance of rows is 12 ft. and the average length of rows is 5 chains, and there are 15 rows, then 15 x 5 = 75—look in right-hand margin of chart, and it will be seen that for 12 ft. between pines 55 lineal chains run to the acre; therefore, as we have 15 x 5 = 75 lineal chains to manure, the area is $\frac{75}{55}$ = 1·36, say 1·4 acres.

Now look at small chart on top left-hand corner of diagram, and under 10 cwt. per acre (amount required) it will be found that for each acre 2 bags of potash, or 3·3 cwt., and 5 bags of fertiliser, or 6·7 cwt., will be required. As there are 1·4 acres in this patch, 2 x 1·4=2·8, say 3 bags of potash, or 4·6 cwt., and 5 x 1·4 = 7 bags of fertiliser, or 9·38 cwt.

Proof—

9·38 cwt. of fertiliser
4·60 cwt. of potash

13·98, say 14 cwt. $\frac{14}{1{\cdot}4}$ = 10 cwt. per acre.

For mixing the manure—as one bag of potash weighs (approximately) 187 lb. and one bag of fertiliser (approximately) 150 lb.—if it is desired to mix the manure in the proportion of 2 of fertiliser to 1 of potash, mix together 1 bag of potash and 2½ bags of fertiliser. If a 7 to 3 mixture is desired, mix 1 bag of potash with 3 bags of fertiliser.

For weighing out the manure to be applied to each side of row, if scales are not available, a kerosene tin may be used as explained below.

A kerosene tin filled to within 1 in. of the top (to allow for a handle) with potash weighs 50 lb., with fertiliser 38 lb., and with mixed manure in the proportion of 2 of fertiliser to 1 of potash weighs 42 lb.

The depth of a kerosene tin within 1 in. of the top is 13 in., which, therefore, gives 3¼ lb. of mixed manure per inch depth of tin as measured with a foot rule.

The following table gives the approximate weight of mixed manure according to depth of tin:—

*Kerosene Tin.*

| | | |
|---|---|---|
| 1 in. deep of mixed manure = | 3¼ lb. | (approx.) |
| 2 in. deep of mixed manure = | 6½ lb. | (approx.) |
| 3 in. deep of mixed manure = | 9¾ lb. | (approx.) |
| 4 in. deep of mixed manure = | 13 lb. | (approx.) |
| 5 in. deep of mixed manure = | 16¼ lb. | (approx.) |
| 6 in. deep of mixed manure = | 19½ lb. | (approx.) |
| 7 in. deep of mixed manure = | 22¾ lb. | (approx.) |
| 8 in. deep of mixed manure = | 26 lb. | (approx.) |
| 9 in. deep of mixed manure = | 29¼ lb. | (approx.) |
| 10 in. deep of mixed manure = | 32¼ lb. | (approx.) |
| 11 in. deep of mixed manure = | 35¾ lb. | (approx.) |
| 12 in. deep of mixed manure = | 39 lb. | (approx.) |
| 13 in. deep of mixed manure = | 42 lb. | (approx.) |

N.B.—In the weights given, the fertiliser was meatworks fertiliser (dried blood and bones), from Messrs. Birt and Co., and the potash was sulphate of potash supplied by the Potash Syndicate of Sydney.

## REPORT ON PERENNIAL RICE.

By C. E. WOOD, Manager, Kamerunga State Nursery.

Seed of perennial rice was received 8th April, 1913. In a small plot, only one plant grew.

Seed received 13th December, planted 14th January; germination very fair. Growth: Slow at first; began to spread by means of its running roots after about two months; height in five months, 3 to 4 ft. Weeds: Owing to hot and wet weather, weeds grew fast, and hand-weeding in rows was necessary; weeds persisted to a certain extent even when the rice attained its full growth. Flowering: Fair; flowering stems being 5 to 7 ft. high. Seed: Very few seeds appeared to mature, and those were hard to winnow by hand on account of the long awns. Only 4 oz. were procured off six rows, each row being 1 chain long. The seed was planted in drills 15 in. apart. When mature, all the blades became spotted with brownish marks, and a sample was sent to the Department for examination, but I understand from Mr. Tryon, whom I saw at the Brisbane Exhibition, that it is nothing dangerous. The plot was cut out in the beginning of July, and now, three months later, little or no growth has taken place, whereas weeds are growing. From this it would appear that both hot and moist conditions are required to make it a success, and I should not be surprised if, in its wild state, it grew in wet or swampy ground.

# Horticulture.

## ON SEEDS.

At a recent meeting of the members of the Charters Towers Horticultural Society, Mr. M. Purdon, head master of the Millchester State School, read a very interesting paper on "Seeds," which we regret was mislaid in our office, but which, none the less, will prove useful to horticulturists notwithstanding the delay in its publication. The paper was as follows:—

### SEEDS.

Every plant possesses what may be termed a life-history—that is, its life has a beginning; it passes through certain stages, and age comes on, and finally it dies.

In all the higher plants the life-history commences with the germination of the seed, continues as that of the seedling, is prolonged as the plant becomes mature, then flowering takes place, seeds are produced, the death of the parent ultimately takes place, and the continuity of the race is kept up by the young plant in the seed.

Plants, then, produce seeds, not, as has sometimes been said, for the use of animals but to provide for the continuity of their particular race or kind.

### PARTS.

All seeds consist of two principal parts—a covering and a living part within it.

The covering may consist of two layers—an outer called the testa, and an inner called the tegmen. Many seeds have only one layer—the testa.

The living part is the plantlet or embryo, and is in fact an immature plant, having a separate existence from that of the parent.

The plantlet consists of different parts, each part serving a different purpose. In the bean it consists—(*a*) of two thick masses called cotyledons, or seed-leaves, placed face to face, and united at one part of their margins. (*b*) A small cylindrical-shaped body lies between these cotyledons or seed-leaves where these unite and is attached to them about its middle. It is conical at one end and blunter at the other.

When the seed germinates the conical end, called the radicle, grows downward, and gives origin to the root of the plant.

The other end, called the pluncule, which lies between the cotyledons, grows upward, and is the bud of the stem of the plant.

This elongation of the pluncule and radicle is the first growth made by this well-known plant.

The cotyledons or seed-leaves of the bean supply nourishment to the growing radicle and pluncule, which absorb it through the points

of attachment; after this, their nourishing matter being exhausted, the seed-leaves shrivel up and rot.

In a grain of wheat the plantlet lies on one side of the seed, between the covering and the albumen, which is white and floury.

It has not two opposite seed-leaves or cotyledons like the bean, but one.

When germination begins, the pluneule and the radicle, not being in organic connection with the albumen, absorb nourishment from it by contact, and not as in the case of the bean, which obtained its nourishment from its seed-leaves.

The presence of one or two seed-leaves is the basis on which botanists divide flowering plants into two classes—the Monocotyledons having one seed-leaf and the Dicotyledons having two seed-leaves. Many common garden plants have two seed-leaves—as the cabbage, lettuce, and beet—whilst the lilies and grasses have one seed-leaf.

## GERMINATION.

The early stages of the development of the embryo are spoken of as germination.

In order that a seed may germinate the following conditions are necessary:—

(*a*) It must be alive.

(*b*) It must have warmth.

(*c*) There must be a certain amount of moisture.

(*d*) It must have a supply of air.

In connection with germination, we should remember that samples of the same kind of seed of different origin often differ in their period of germination. These variations may be due to peculiarities in the seed, such as age, ripeness, and nature of the seed-coat.

In the case of large seeds, which contain a large supply of reserve food, the seedlings begin to take in food before the reserve supply is exhausted, but in the case of the smaller seeds the reserve supply is sometimes exhausted before the roots and leaves are sufficiently developed to carry on their work properly, when the plants either receive a temporary check or die. This is likely to happen when the seeds are planted too deeply, as in that case the reserve food may be exhausted in developing a shoot long enough to carry the leaves above the surface.

## PLANTING OF SEEDS.

In connection with the planting of seeds, we must bear in mind that Nature's laws demand that certain conditions must prevail, or we cannot expect favourable results from our seed-sowing. We might, in fact, say that the seeds are little autocrats, who insist upon all the necessary conditions being present before they will make from their dormant state, and burst forth into buds.

For example, if pansy seed be planted in the garden during hot, dry weather, not one seed in a hundred will germinate, but if the same quality of seed be planted in a seed-box, frame, or bushhouse, say, in

April, it is very likely that the seeds will quickly germinate and be ready for transplanting in a few weeks.

Again, if seeds of gloxinia and cineraria were sown in the open, very few, if any, would germinate.

Even when sown in a frame, seed-box, or in the bushhouse, many of our choice seeds require special care, and we should be very careful before blaming the seedsman for supplying us with inferior seed to see that we ourselves are not to blame for not carrying out the conditions necessary for the germination of these seeds.

Some of the points to be kept in mind in connection with seed planting are:—

(*a*) The proper time to sow the seed. All plants have their season of growth, and if sown at the wrong time they will not germinate. Sunflower, zinnias, calliopsis, and others of our well-known annuals are prolific seed-bearers, and invariably produce plants from self-sown seed, but these seeds remain dormant in the soil until the conditions necessary for their germination take place. Therefore, if these seeds are planted at the wrong period of the year they will not germinate until the required conditions are present. English annuals—such as candytuft, dianthus, phlox, pansies, &c.—should be sown during April, so as to avoid the great heat of the preceding months, and also the heavy rains which sometimes fall during those months.

(*b*) The next point of importance is the proper soil to sow the seed in. A good soil for sowing seed in consists of equal parts of sand loam and leaf mould, with a mixture of fine silver or coarse sand.

(*c*) The next point is the manner in which the seed should be sown.

Some growers prefer sowing theirs in a glass frame, others in seed-boxes or seed-beds, and where a small number of plants is needed in an earthenware seed-pan.

## THE SEED-BOX.

Get a shallow box about 4 or 5 in. in depth, in which a number of holes have been made in the sides and bottom. Place in this to a depth of about 2 in. good draining material, as broken rocks, coal ashes, &c. Now fill up to within half an inch of the top of the box with your prepared soil, and press the soil firmly and evenly with a board or anything having a smooth, even surface; and now place some fine sifted soil on this, and give the soil a thorough watering.

Sprinkle the seeds firmly and evenly on the surface, and if the seeds are very fine press them into the damp soil. If the seeds are a fair size sift on a little more fine soil before pressing. Some growers prefer sprinkling some fine silver sand, and on this a light covering of thoroughly dried manure. The sand tends to keep an even moisture about the seeds, and the manure prevents caking.

If the soil was properly soaked before planting, no water will be required until the seeds germinate. If by any means the soil has become dry, either water by immersion or use a water-can with a fine rose.

A good rule in sowing seed is to remember that the smaller the seed the lighter the covering should be.

A sheet of glass placed over the box will tend to prevent evaporation, and also to maintain an even temperature. When the seeds have germinated the glass should be tilted to admit air, and should then be gradually removed.

Place the seed-boxes where they will be protected from the afternoon sun. It is necessary to protect the boxes from the forenoon sun, too, by covering the boxes with some light material until the seeds germinate. Then gradually harden the young plants by gradually removing the covering, so that when they are planted in the open beds the change will not be too severe.

It is necessary that all nursing-beds and seed-boxes be protected from heavy rain and hot or cold winds.

## TRANSPLANTING.

It is advisable to choose, if possible, a showery day for transplanting seedlings. Have the soil well damped, and the holes should not be made until the young plants are ready to go in. Make the holes with a pointed stick, and press the soil firmly about each plant, being careful to lift as much earth as possible with the seedling, and plant it to about the same depth as it was in the seed-box.

When transplanting young seedlings into the open beds put about a handful of well-rotted farmyard manure, well mixed with fine soil, under each plant, and if warm weather sets in protect the plants from the sun with two or three small branches, and keep well watered.

## SELECTION OF SEEDS.

"The best seed obtainable is never too good" is a safe rule to adopt when sowing in the garden or in the field. Avoid cheap seeds. They may or may not be good. The same amount of time and labour is required for both, but the results are very different.

It is absolutely necessary to sow good seed if we wish to raise good plants. A good seed, and especially a good seed from a good plant, will invariably produce a better plant than an inferior one will produce. Seed for sowing should always be selected from the best plants.

In connection with what can be done with carefully selected seed, careful testing of the seed and intense cultivation, I might mention that a few years ago a Boys' Corn Club was formed in some of the Southern States of the United States of America, and prizes were given for the most successful results. In the year 1910 more than 46,000 boys entered for this competition, each boy being allowed 1 acre of land. The winner turned up in a lad 12 years of age, and he succeeded in producing the enormous quantity of 228 bushels of maize from his acre plot. Another lad, the son of a country minister, succeeded, with the prizes he won at State and county fairs, and the price he received for his crop, in making just £200 profit from his acre plot.

Another lad whose father knew all about maizegrowing—or, rather, thought he did—obtained 84 bushels from his acre plot, while his father's crop from land enclosing his son's land on three sides averaged 19 bushels. I might mention that the average for the whole of the United States was about 25½ bushels.

These record crops of maize mean a great deal to the boys, for the corn sells as seed corn in their districts at several times the market price for ordinary maize.

Probably as they grow older some of them will turn their attention to the raising of seed-corn altogether.

## DISTRIBUTION OF SEED.

At the beginning of this paper I mentioned that plants produced seeds in order to provide for the continuity of their particular race or kind, and Nature has provided means for distributing these seeds in many ways. Just as the perfume, shape, and colour of flowers have to do with the distribution of pollen, so the colour, shape, and texture of fruits have to do with the distribution of seeds in their native state.

1. The seeds of fruits may be scattered by the wind. The seed of fruit has often wing-like appendages which enable the wind to blow the seeds away from the parent plant. The Scotch thistle and the common sow thistle are well-known examples of this method.

2. The seeds of some plants are scattered by clinging to animals. It is in this manner that the seeds of the Bathurst burr and the Noogoora burr are spread far and wide in South Queensland.

3. Succulent fruits, such as cherries and gooseberries, are eaten by birds. The undigested seeds are carried away and dropped, and so the plants are spread. The well-known prickly pear is a familiar example of this method. In some parts of Queensland the emu has been the means of spreading this plant over large areas. The lantana, another noxious plant, is also spread by birds eating the fruit and dropping the seeds.

4. The fruit of some plants opens with a jerk, and the seeds are ejected some distance from the parent plant, as in the Balsam.

5. Then, again, seeds and fruits are spread by artificial means.

The seeds of many noxious plants have been introduced into this country in the straw packing of cases of merchandise, and also in fodder, and having found a suitable soil and climate thrive here to our farmers' and graziers' very great annoyance.

His paper, he concluded, was chiefly written on experience gained in a fertile district in the South with regular rainfall and good soil, while here the rain was in the first half of the year, and the soil clayey, and if watered on the surface became as hard as a brick. The conditions were absolutely different here.

The paper was greeted with loud applause. The president expressed the thanks of the society to Mr. Purdon for his paper, and asked for discussion.

# Tropical Industries.

## COTTON CULTIVATION IN UGANDA (E.A.)

In Uganda the Department of Agriculture is constantly at work on the improvement of the staple of the progeny of American Upland seed imported into the country in 1910, and issues the best seed available to cultivators. The whole seed supply is under the control of the Department, and only seed issued by, or approved by, the Department may be sown.

As to the planting seasons in the Protectorate, these are so variable and local as regards rainfall that no definite time can be fixed for the sowing. The general sowing season extends from April to July, according to the occurrence of rain. In one district (Teso) the Department has introduced a system of double sowings. Each native cultivator has two plots, one of which he sows in April or May, and the other in June or July, thus ensuring that at least one of his plots adapts itself to the vagaries of the season. In a favourable year, both his plots may do well, and he profits accordingly.

In Queensland, on the contrary, there is one time of the year for sowing cotton, and that is in August or September, according to locality and liability or otherwise to frosts. It may be noted that Uganda lies on the Equator, whilst Queensland extends from about 10 degrees S. to 28 degrees S. of the Equator. Hence the seasons south of the Tropic of Capricorn are, as a rule, fairly regular, and no second planting is needed. By sowing in August or September, or even later, the crop will be ready for picking in January or February, and the picking may extend over several months, say, up to May or June, when frosts may be expected. The pickers in East Africa are provided with two bags, or rather a bag with two pockets, so that the clean and dirty cotton may be kept separate. This method might be adopted with advantage in our cotton fields. The admixture of dirty cotton or of damaged bolls discounts the value of the cotton to the purchaser, although he pays full value for clean seed cotton.

A considerable amount of cotton is grown in the German colonies of Africa, and of the Pacific Islands, and there is no reason, climatic or even economic in respect to labour, why Queensland should not this year plant cotton largely. Owing to the present European war, cotton cargoes from German possessions will dwindle to vanishing point, and it may be that, as was the case during the civil war in the United States, the opportunity for the expansion of the industry in Queensland, if seized now, will once more turn to the advantage of our State and possibly result in a permanent revival of cotton-growing, less in degree,

of course, than the boom during the American war, but sufficient to establish cotton-growing as one of the staple industries of the State, and may further lead to the erection of many ginneries and cotton-mills, as well as of oilmills.

## THE CULTIVATION AND CURING OF GINGER.

For the information of several correspondents who last month wrote asking for information on the cultivation of ginger, we republish the following article on the subject which appeared in the issue of this Journal for April, 1906:—

### GINGER.

Here we have another article which is in universal demand, and for which good prices can be obtained. Ginger grows to perfection in any suitable soil on all the coastal lands of the State. There is no more difficulty in growing ginger than in growing arrowroot, peanuts, castor oil, or sunflowers. There is, to be sure, a considerable amount of light labour required to prepare the rhizomes for market, but the preparation is so easy that it can be done by girls and boys.

Two essential requirements for the growth of the plant are—sunshine and moisture. These conditions are found in Eastern Queensland. The process of planting differs little from potato-planting. A "finger," containing an eye or embryo, is planted in holes or trenches a few inches beneath the surface, about 1 foot apart. All that is needed is to keep the ground clean, and the young plants well watered, the soil being, of course, well drained, because stagnant water gives rise to black rot, and in this condition the root fills with water, swells, has a bad smell, and is then attacked by insects and worms.

The very highest quality of ginger is produced on deep, rich, black scrub or virgin forest soil. It can be grown year after year on the same ground, and when the soil becomes too poor to grow "white ginger" an inferior variety—the blue—will yield good crops.

More depends on the curing of the ginger than on the soil, and regularly shaped "hands," as the roots are called, command the highest price in the market.

Planted in October, it is ready for digging in July or August. When the stalk withers it is ready for harvesting. In digging out the roots they must be carefully turned out with a fork without bruising or breaking the hands. These hands are divested of fibrous roots and of all adhering soil, and this must be done as soon as they are dug, for, if allowed to dry with soil, &c., adhering to them, the ginger will never be white. After cleaning, the roots are thrown at once into water, and are ready for peeling.

The peeling is an art easily learned. As the oil cells on which the aroma of ginger depends are close to the surface of the root, the peel must be very thinly taken off with a narrow-bladed knife. As fast as the

copra, &c., the same); but at the same time it pays and pays well, since that which cost Rs. 24 to produce, including the Rs. 12 for manuring, sold at an average price of Rs. 96·47, or four times the price, and, although values are now lower, a forward contract was made for the sale of 2,000 candies during 1914 at Rs. 95 per candy for No. 1 copra. Meanwhile those who shirk adequate cultivation and manuring should note that this estate, through the chairman, prides itself on the fact that its lands are clean, and that a careful system of husbandry has been pursued throughout this and last year, and as a result the palms are in an excellent and healthy condition, and the output this year, so far, is ahead of 1913.

Here, then, we have three important facts, viz.:—It costs in Ceylon on a well-managed estate Rs. 24 a candy, or 128s. a ton, to produce copra, of which expense half is incurred in manuring the palms, and that the copra realised an average price during 1913 of Rs. 96 per candy, or £25 12s. a ton in Ceylon; that after a good year of rain 4,396 nuts are sufficient to make a ton of copra, whilst a less heavy year can increase the number required by 15 per cent. Such details are worth noting, since we are told an ounce of fact is worth a pound of theory.—"Tropical Life."

## PADDY (RICE) FOR THE DISTILLERY.

Mr. J. F. Keane, Carbeen, writes us as follows on the use of Paddy for the manufacture of spirit fuel:—

"In 1888 I made a voyage to Japan from Europe in the s.s. "Chateau Leuville," a very fast, old, erstwhile French mail boat. We cruised entirely round the two islands and through the inland sea, picking up Paddy at every port we came to. We took about 5,000 tons of it to Holland to be used in the making of square gin. I was informed that the insoluble constituents of the grain would be converted into pulp for cigarette paper and the chaff into wrapper-paper. We discharged about 100 tons damaged, on account of the long passage, 55 days, but I was told there would be a profit even in that as a size for rope and textile fabrics. I should think Port Darwin must be some 5,000 or 6,000 miles nearer to Amsterdam than Nagasaki. Wild rice, I am almost certain, is typical—grows right across North Australia from the Pacific to the Indian Ocean. Nothing is more certain than that if it can be shown that any foodstuff or merchantable commodity can be more economically and abundantly produced in one place than it can in another, money will find its way to it if it has to precipitate a great European war in order to do so. Coloured labour cannot compete with the combined harvester. There were some thousands of Chinamen in South Australia thirty years ago. They fled almost to a man before the wheat stripper."

# Entomology.

## THE MAIZE MOTH INJURING CUSTARD APPLES, ETC.

In response to a letter received by the Department of Agriculture and Stock from a resident of Woodford, who makes a study of fruit and vegetable insect pests, with reference to the damage done to many fruits such as the custard apple by the maize moth, the Government Entomologist, Mr. Hy. Tryon, has prepared the following valuable report on the subject:—

The insect that Mr. F. Wise refers to in his communication of 17th instant as injuring the custard apple and many other fruits is evidently the caterpillar of a moth named *Dichocrocis puncterernalis*. No special pamphlet has been written regarding this pest, but it has been incidentally referred to in more than one publication and received a somewhat extended notice in a report, "Insect and Fungus Pests," issued many years since and for a long time altogether out of print.

The main facts regarding it are, that it not only attacks the custard apple, but also the fruits of the following trees:—Peach, orange, papaw, loquat, castor oil, &c.; the pods of certain bean plants, and the cobs and stalks of maize, and also the stems and heads of millet. In the case of the papaw, it not only is partial to the fruit, but it also very seriously injures the stem, especially in the neighbourhood of its apex, and in addition to other food plants mentioned, it also damages cotton, tunnelling into both "bolls" and young shoots.

It lays its eggs singly on the plant destined for attack, and generally in some part more or less sheltered, as in the axils of leaves, and in places where fruit is in contact with fruit or foliage. There are at least two broods of caterpillars during the summer months. During the winter the insect remains as a caterpillar, not changing to a chrysalis until the cold weather has passed away. It commonly crawls out of its tunnel in the fruit, &c., to pupate, but, as a rule, does this after travelling but little. The moth is a night flyer, but is not attracted by light. In appearance it is orange, black-speckled, and measures about ¾in. across the expanded wings.

It has been found very difficult in practice to deal with it, since it can derive its sustenance as a caterpillar from so many sources. However, some benefit has been found to result from assailing it during the winter months, when it leads a more or less inactive life as a caterpillar, in sites where previously it has been exercising its destructive habits. In attacking it, then, all rubbish that may harbour it should be sought out and destroyed, *e.g.*—(1) dry, shrunken and blackened peaches that, as commonly happens, may remain upon the trees long after the

fruit has been destroyed; (2) maize cobs and maize stalks, that injured by and still harbouring the insect are, under ordinary circumstances, left for weeks often in the field after they have been severely damaged and are already dead or dry; so also (3) with respect to the "bolls" and stalks of cotton plants. Indeed, it should be an object to seek out all sites of the occurrence of the caterpillars and destroy them so as to reduce the numbers that otherwise they would give rise to. On the eggs hatching, the tiny grubs may remain a short time feeding externally before mining into their food-plants. This permits their being assailed by insecticides such as Paris green or arsenate of lead. This method should be especially available when the insect threatens to attack the topmost growth of the papaya or papaw, which should preferably receive one or other of these in the form of a spray, in anticipation of this event.

Again, it will probably be found that in every district where the insect occurs, and notwithstanding several vegetable products are available as food for the caterpillars at one and the same time, one of these receives marked preference. This experience has led to the growth of special plants, that are styled and that act as "trap crops." Thus maize has been grown to protect cotton, it being the practice to remove it for use as green fodder or ensilage when the caterpillar is still feeding within it, but is not "full-fed." In this instance of the use of a trap crop, it may be objected that, as due to this practice, more caterpillars might be present than would otherwise happen, the parent moth being in this case attracted from the surrounding country by the maize—a plant to which it is very partial.

Again, poisoned baits might be made available, for these put out at night might attract the moth to its destruction; but we have no experimental evidence pointing to the efficacy of this method. Fowler's solution and syrup might be tried in this connection. As already remarked, the moth does not come to light—trap-lanterns, therefore, cannot be employed with any advantage.

The insect, as occurring in Queensland, has, as far as we can ascertain, only one parasite, a small hymenopterous insect. This apparently does not control its increase to any extent. I have been prepared to find that in Southern India, where the *Dichrocis* also occurs, it would have been otherwise, but our local inquiries have not served to throw any light on the question. Amongst birds, several of the honey-eaters assiduously seek and destroy the caterpillars, employing their sharp-pointed beaks in extracting them from places in which they may be ensconced—*e.g.*, amongst the fruitlets constituting the loquat bunch, amid castor-oil capsules, or within the dense heads of millet, &c. The preservation of these feathered friends is, therefore, on this ground especially, a matter of high expedience.

These facts relating to this papaw-loving caterpillar should, when perused by one of Mr. Wise's intelligence, lead to the propounding of methods especially suitable locally for coping with so destructive a pest.

# General Notes.

## A FLEA-TRAP.

A flea-trap is in general use in Szechuan. It consists of two pieces of bamboo, one inside the other. The outer is about 1 ft. in length, and 2½ in. in diameter; it is longitudinally fenestrated. The inner bamboo is of equal length, but only about 1 in. in diameter. It is kept in position by means of a short wooden plug. The inner bamboo is coated with birdlime or the like; the outer bamboo is protective. The trap can be placed under bedclothes, among rugs, and so forth; any fleas that go through get caught on the birdlime. Dr. Hindle suggests in "Knowledge" that the trap might be of great value in connection with plague epidemics.

Will somebody try this? Bamboos are plentiful in Queensland.

## NATIVE BIRDS PROTECTION ACTS.

### DESTRUCTION OF NATIVE BIRDS.

Notwithstanding the many insect pests which damage or destroy crops of all descriptions, it seems impossible to impress upon the holiday-maker's mind that, were it not for insectivorous birds, these pests would increase to such an extent as to make the raising of field crops, vegetables, and fruit too expensive a business to be profitable. Even a gun tax, to include the mischievous pea-rifle, would be powerless to protect the birds, in consequence of the practical impossibility of enforcing it in country districts. Whilst the legitimate sportsman carefully observes the close season for game birds, the boy with the pea-rifle is troubled with no conscientious scruples on that score. He looks upon every member of the feathered tribe which comes within reach of his weapon as the legitimate object of his nefarious sport. If the attention of these shooters were directed only towards the fruit or leaf eating birds, no objection could be raised towards their sacrificing thousands of them. Unfortunately, they cannot discriminate between useful and destructive birds; and who is there to teach them? If every State and private school were supplied with well-executed coloured plates of both classes, the teachers would be able to do a great deal towards minimising the evil. We proposed at one time to issue with every Journal one or two such coloured plates, but, unfortunately, these are expensive, and the times have of late been too bad to enable us to carry out the idea. But we shall by no means lose sight of it. Take a few of our insectivorous birds, such as crows, ibis, curlews, owls, night-jars (otherwise moreporks), &c. The crow is generally cunning enough to distinguish between a stick and a gun, and less frequently falls a victim

to the gunner. Crows, although they are notorious for destroying chickens, young birds, hares, &c., yet render signal service to the farmer by destroying mice, cutworms, wireworms, &c. It has been calculated in Germany by Herr Rörig that "a field mouse and its progeny will destroy 1,000 plants of grain whilst the latter are developing." We know what tremendous losses the plague of mice inflicted on farmers last year. He also stated that "About 3,000 crows, by destroying mice and other vermin, benefit farmers to the amount of £2,500 per annum. In other words, what is commonly but erroneously known as the carrion crow benefits him to the amount of 11d. per bird per annum over and above the loss it causes him by the destruction of chickens, eggs," &c. Anyone who has watched the flocks of ibis on newly-ploughed land, thrusting their long curved bills deep into the soil, and devouring thousands of worms, grubs, beetles, and larvæ, must be impressed with the great value of these birds; yet how often are they shot in mere wantonness and left to rot on the ground? The number of mice consumed by owls is something incredible.

In 1905 we were indebted to Mr. Hy. Tryon, Government Entomologist and Vegetable Pathologist, for the following information on the food of various birds. He has closely studied their habits and examined their stomachs. This scientific phase of the question we do not attempt to deal with; the object of this article is to draw attention to the indiscriminate shooting of birds, destructive or useful, for no other purpose but sport, or "to keep one's hand in," as swallow and marten shooters express it:—

## INSECTIVOROUS AND PARTLY INSECTIVOROUS BIRDS.

*Ibis.*—The food of the birds comprised by this name consists of frogs, especially in the tadpole state, grasshoppers, grass-eating caterpillars, ground-frequenting caterpillars, soil-frequenting "grubs" generally, young fish, &c.

*Carrion Crow.*—No bird in Australia bears this name that may be erroneously bestowed on the common crow or raven, or on the white-eyed crow, both of which possess feeding habits distinct from those of the European "carrion crow." The food of the bird of coastal Queensland, the former of the two kinds mentioned, includes grasshoppers, locusts, cicadas, moths, grass-eating caterpillars, soil-frequenting grubs, and large insects generally. Ticks, rats and mice, eggs of poultry and wild birds, young chickens and ducks (exceptionally); seeds of cereals when broadcasted, plantlets of cereals, maize from the cob (exceptionally), lambs, the eyes of cast ewes and of bogged sheep and cattle; fruit, *e.g.*, pineapples and watermelons; carrion and offal generally.

*Pied Crow* (*Shrike*).—Insects of various kinds, especially the larger ones—*e.g.*, grasshoppers, locusts, &c.; seeds, berries of wild and cultivated

trees, coffee berries, fruit generally—oranges, figs, grapes, strawberries, to most kinds of which it is highly destructive; carrion, including dead birds, &c.

*Morepork* (Ninix).—The smaller kinds feed on various nocturnal insects, on rodents, on small birds, on young domesticated pigeons. The largest kinds the same, and on birds as large as a laughing jackass—*Decelo sp.* (Brennan).

*Night-jar.*—On various nocturnal flying insects, and especially on moths.

*Laughing Jackass.*—On large insects, grasshoppers, locusts, &c., lizards, iguanas (small), snakes, small rodents (rats and mice), chickens, young birds.

*Kingfishers* (1. *Halcyon*).—Feed on grasshoppers, mantidæ, noctuid caterpillars, lizards (small), tree frogs, spiders, tipulid flies, beetles, white-ants.

*Kingfishers* (2. *Alcyone*).—Small fish, aquatic insects, flying insects hovering over water.

*Butcher Birds* (*Cracticus spp.*).—Feed on large insects (grasshoppers, &c.), small lizards and other reptiles, small snakes, caterpillars, soil-frequenting "grubs," small rodents (mice, &c.), nestling birds, small birds both wild and domesticated, very young chickens, hive bees (exceptionally).

*Dollar Birds.*—Insects (especially beetles) occurring on the wing and in tree-tops; hive bees (exceptionally).

The whole of the State is now under the operation of the Acts, and Queensland is divided into two districts, for which two distinct close seasons are provided. New names have been included in the lists of protected birds. Schedule A contains the names of those totally protected, while in Schedule B will be found those to which partial protection only is afforded. Considering the valuable asset insectivorous birds are to the State, and especially to those people whose occupation is connected with the land, there should be ready assistance given to the Department in the protection of our native birds. It should be noted that any person can prosecute under the Acts.

Reserves can be proclaimed with the consent of the owner or occupier of private lands, and rangers (honorary) appointed ,when a reserve has been created.

The following particulars—showing the birds which are subject to the operation of the Native Birds Protection Acts, the periods of the year during which the Acts are in operation, and the reserves set apart for the preservation and protection of such birds—are published for general information:—

# BIRDS ABSOLUTELY PROTECTED THROUGHOUT QUEENSLAND.

## SCHEDULE A.

| Common Name. | Technical Designation. |
|---|---|
| Australian Bee-eaters | Merops |
| Babblers | Timeliidæ |
| Bell Birds | Oreoica |
| Bitterns | Ardeiformes |
| Black Cockatoos of all species | Calyptorhynchus |
| Black Swans | Anatidæ |
| Bower Birds of all species | Ptilonorhynchidæ |
| Bush Chats of all species | Ephthianurinæ |
| Cassowaries | Casuariidæ |
| Caterpillar-eaters | Campophagidæ |
| Coachwhip Birds | Timeliidæ |
| Coucals or Swamp Pheasants | Centropodinæ |
| Cuckoo Shrikes | Campophagidæ |
| Cuckoos of all species | Cuculidæ |
| Diamond Birds (Pardalotes) | Dicæidæ |
| Dollar Birds (Rollers) | Eurystomus |
| Egrets of all species | Ardeiformes |
| Fantails | Muscicapidæ |
| Field Wrens | Timeliidæ |
| Flower-peckers | Dicæidæ |
| Fly-catchers (Wagtails) | Muscicapidæ |
| Fly-eaters | Muscicapidæ |
| Frogmouths | Podargidæ |
| Grebes | Podicipediæ |
| Herons | Ardeiformes |
| Honey-eaters (except Miners, Wattle Birds, Friar Birds) | Meliphagidæ |
| Ibises | Ardeiformes |
| Jabirus | Ardeiformes |
| Kingfishers (all species) | Alcedinidæ |
| Kites | Elanus |
| Land Curlews or Stone Plovers | Œdicnemidæ |
| Larks of all species | Motacillidæ, Alaudidæ |
| Laughing Jackasses | Alcedinidæ |
| Lyre Birds | Menuridæ |
| Magpies | Gymnorhina |
| Magpie Larks | Grallina |
| Martins | Hirundinidæ |
| Nightjars or Goat-suckers | Caprimulgidæ |
| Nuthatches or Tree-runners (Woodpeckers) | Sittidæ |
| Owls | Strigidæ |
| Parras | Parridæ, Glareolidæ |
| Parrots (Ground or Swamp) | Pezoporus |
| Pipits | Motacillidæ, Alaudidæ |
| Pittas of all species | Pittidæ |
| Pratincoles | Parridæ; Glareolidæ |
| Regent Birds | Genus Sericulus (Ptilonorhynchidæ) |
| Rifle Birds | Paradiseidæ |
| Robins of all Species | Muscicapidæ |
| Satin Birds | Genus Ptilonorhynchus (Ptilonorhynchidæ) |
| Shining Starlings (Calornis) | Eulabetidæ |
| Shrike Tits | Muscicapidæ |
| Song Larks | Timeliidæ |
| Spoonbills | Ardeiformes |
| Storks | Ardeiformes |
| Swallows | Hirundinidæ |
| Swamp Pheasants | Centropodinæ |
| Swifts | Cypselidæ |
| Thickheads (Whistlers) | Muscicapidæ |
| Thrushes of all species | Turdidæ, Prionopidæ |
| Tit Warblers (Tree Tits) | Sylviidæ |
| Tree-creepers | Climacteris |
| Tree-runners | Sittidæ |
| Warblers | Sylviidæ |
| White-eyes or Silver-eyes | Zosteropidæ |
| Wood Swallows | Artamidæ |
| Wren Warblers | Sylviidæ |
| Wrens of all species | Sylviidæ |

## BIRDS PARTIALLY PROTECTED THROUGHOUT QUEENSLAND.

### SCHEDULE B.

| Common Name. | Technical Designation. |
| --- | --- |
| Bronzewing Pigeons | Columbæ |
| Brown Hawks | Falconidæ |
| Bustards or Plain Turkeys | Otididæ |
| Coots | Rallidæ |
| Cranes | Gruidæ |
| Crakes | Rallidæ |
| Curlews | Charadriidæ |
| Dottrels | Charadriidæ |
| Doves | Columbæ |
| Ducks, Wild, of all species | Anatidæ (excepting Black Swans) |
| Emus | Dromæidæ |
| Fig Birds | Oriolidæ |
| Finches (including Plumhead, Banded, Painted, Zebra, and Redheaded Finches, &c.) | Ploceidæ |
| Geese, Wild | Anatidæ (excepting Black Swans) |
| Land Rails | Rallidæ |
| Mallee Fowls | Megapodiidæ |
| Moor Hens | Rallidæ |
| Native Companions | Gruidæ |
| Native Hens | Rallidæ |
| Orioles | Oriolidæ |
| Pigeons, all Wild | Columbæ |
| Plovers | Charadriidæ |
| Quails | Phasianidæ, Turnicidæ |
| Rails, Land and Water | Rallidæ |
| Scrub or Brush Turkeys | Megapodiidæ |
| Scrub Fowls | Megapodiidæ |
| Sea Birds, all | |
| Turkeys, Plain and Scrub or Brush | Otididæ and Megapodiidæ |
| Waders | Charadriidæ |
| Water Rails | Rallidæ |

*Close Seasons.*

In District No. 1, from the first day of September in each year to the thirty-first day of March in the following year, inclusive.

In District No. 2, from the first day of November in each year to the thirty-first day of May in the following year, inclusive.

(With the exception of emus on prickly-pear infested lands, where the close season shall be from the first to the seventh day of July in each year.)

For districts, *see* map.

## PENALTIES.

If any person shall wilfully kill or destroy any protected native bird, or shall use any instrument whatever, net, or other means for the purpose of killing or destroying any native birds, within the periods hereinbefore mentioned, such person shall, upon conviction, **pay a fine of not less than one pound or more than five pounds.**

If any person shall buy, sell, or knowingly have in his possession, house, or control any native bird at any time within the period hereinbefore mentioned, he shall **pay a penalty not less than one pound or more than five pounds for every bird.**

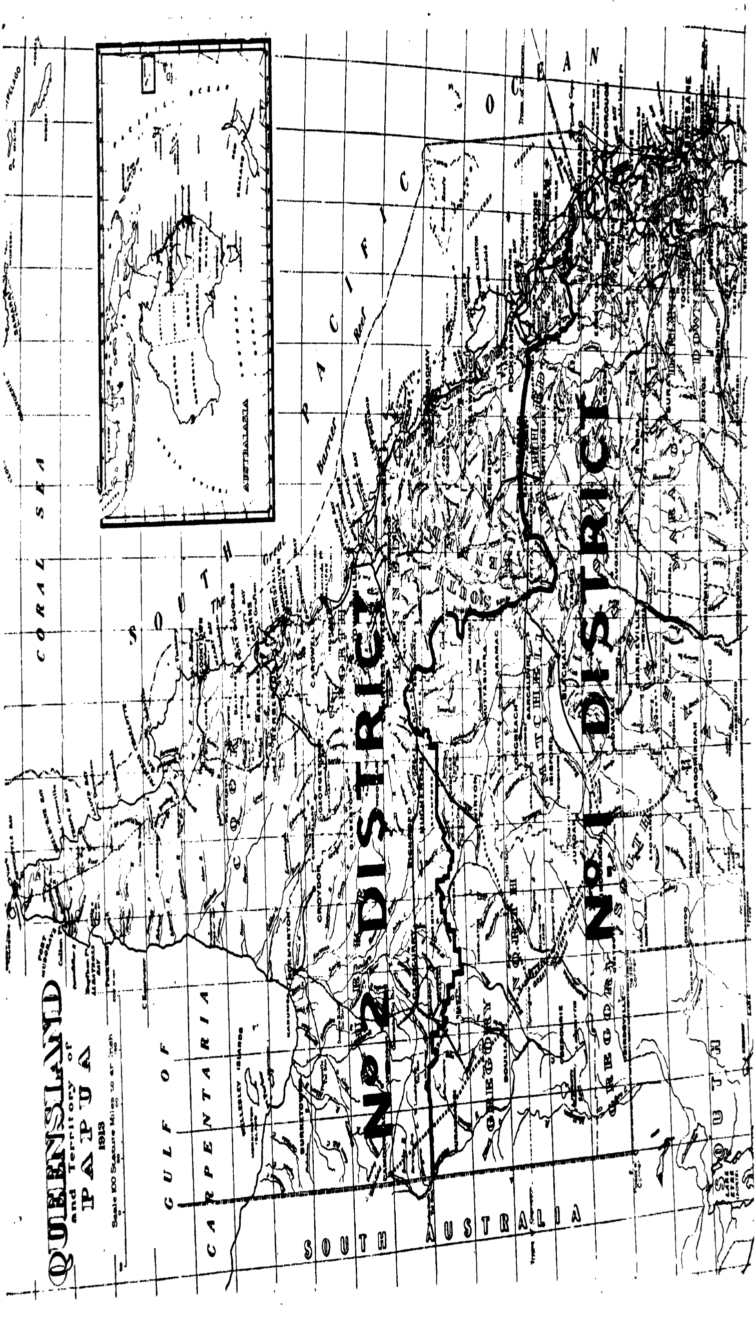
If any person wilfully kills, destroys, or captures any native bird, or uses any instrument, net, or any other means whatever for the purpose of killing, destroying, or capturing any such bird, while it is within or flying over a reserve, he shall be liable upon conviction to pay a **fine of not less than one pound or more than five pounds.**

A moiety of every penalty recovered under the Act shall be paid to the person or persons laying the information.

# LIST OF RESERVES WITHIN WHICH THE DESTRUCTION OF NATIVE BIRDS IS PROHIBITED DURING THE WHOLE YEAR.

| Situation of Reserve. | For Proclamation and Boundaries see *Government Gazette*. Date. | Part. | Page. |
|---|---|---|---|
| Parish of Enoggera, county of Stanley (Enoggera Reservoir and Catchment Area) | 29 Aug., 1885 | II. | 769 |
| Parish of Gracemere, county of Livingstone | 29 Aug., 1885 | II. | 769 |
| Parishes of Toorbul, Beerwah, and Bribie, county of Canning (Pumice Stone Channels and the shores thereof) | 12 Sep., 1885 | II. | 897 |
| **Parishes of Crow's Nest and Douglas, counties of Cavendish and Aubigny* | 10 Oct., 1885 | II. | 1253 |
| **Parish of Emu Creek, county of Cavendish* | | | |
| **Parish of Douglas, county of Aubigny* | | | |
| Parish of Nerang, county of Ward, Southport | 5 June, 1886 | I. | 1946 |
| Parishes of Moggill and Indooroopilly, county of Stanley (Gold Creek and Moggill Creek Drainage Areas) | 13 July, 1889 | II. | 797 |
| Parish of Boonara, county of Mackenzie (on the leased part of Boonara Run) | 14 Sep., 1889 | III. | 99 |
| Parishes of Enoggera and Indooroopilly, county of Stanley (Mount Coot-tha Reserve) | 20 Dec., 1890 | III. | 1403 |
| Parish of Oxley, county of Stanley (Chelmer Recreation and Water Reserve) | 4 Mar., 1893 | I. | 670 |
| Parish of Hewittville, county of Livingstone (Reserve for Water, Emu Park) | 18 July, 1893 | II. | 583 |
| Parish of Ossa, county of Carlisle, Seaforth | 1 Jan., 1898 | I. | 21 |
| Parishes of Cressbrook, Bowman, and Neara, county of Canning | 11 June, 1898 | I. | 1596 |
| Lake Clarendon | 24 Mar., 1900 | I. | 961 |
| England and Clarendon | 25 June, 1900 | I. | 1650 |
| Fitzroy, Nicholson, Faraday, Calioran | 6 July, 1901 | II. | 564 |
| Gavial and Gracemere (The Duck Pond) | 13 July, 1901 | II. | 633 |
| Horseshoe Lagoon, parish of Selkirk | 16 Aug., 1902 | II. | 421 |
| Cloyna | 28 Dec., 1901 | III. | 990 |
| Parishes of Antill and Jarvisfield | 30 July, 1904 | II. | 249 |
| Parish of Jarvisfield (Church Lagoon) | | | |
| Ditto (Red Lily Lagoon) | | | |
| Parish of Rockhampton (Murray's and Jardine's Lagoons) | 27 Aug., 1904 | II. | 493 |
| Parish of Charters Towers (Burdekin Weir) | 29 Oct., 1904 | II. | 901 |
| Dunk, Kumboola Island, and Mount Islet, the Family Islands (comprising Thorpe, Richards, Wheeler, Coombe, Bowden, Smith, and Hodson Islands), and Brooks Islands | 13 May, 1905 | I. | 1546 |
| Parish of Yeerongpilly (Russell Wilkins) | 16 Dec., 1905 | II. | 1273 |
| Ditto (Water Reserve) | | | |
| Parish of Enoggera (Private lands on Toowong Creek) | 11 Aug., 1906 | II. | 274 |
| Parish of Yaamba (P. F. MacDonald's property) | 8 Sep., 1906 | II. | 514 |
| Parish of Noogoon (Mud Island) | 8 Dec., 1906 | II. | 1195 |
| Parish of Broadmere (Lake Murphy | 13 Feb., 1909 | I. | 341 |
| County of Stanley (The Redcliffe Shire) | 20 Mar., 1909 | I. | 738 |
| Parishes of Wysebv and Aubrey (Stud Farm for Breeding Police Horses) | 10 July, 1909 | II. | 70 |
| Parish of Pentland (Pentland Dam and Swamp) | 24 July, 1909 | II. | 220 |
| Parish of Dugandan (A. J. McConnell's property) | 4 Sep., 1909 | II. | 587 |
| County of Nares (The Douglas Shire) | 16 April, 1910 | I. | 1002 |
| County of Elphinstone (Abattoir Reserve, Townsville) | 21 May, 1910 | I. | 1326 |
| Parish of Taylor, Toowoomba District (Jubilee Park), Redwood Park, Picnic Point, and One-tree Hill) | 8 Oct., 1910 | II. | 1010 |
| Parish of Tingalpa (Shire of Wynnum) | 18 Feb., 1911 | I. | 930 |
| Gladstone Land Agent's District (Capricorn Group of Islands) | 5 Aug., 1911 | II. | 422 |
| Mackay Land Agent's District (Orphanage Swamp and Denman's Water Hole) | 23 Sep., 1911 | II. | 820 |
| Parishes of Rockybar and Eumara (Reeves Lake, &c., on Eumara and Gainsford Holdings) | 29 June, 1912 | I. | 1711 |
| Shire of Widgee | 20 Dec., 1913 | II. | 1741 |
| Parish of Stradbroke (Myora) | 11 April, 1914 | I. | 1036 |
| Shire of Maroochy | 2 May, 1914 | I. | 1173 |
| County of Ward, area on coast from Southport to Pt. Danger | 4 July, 1914 | II. | 78 |

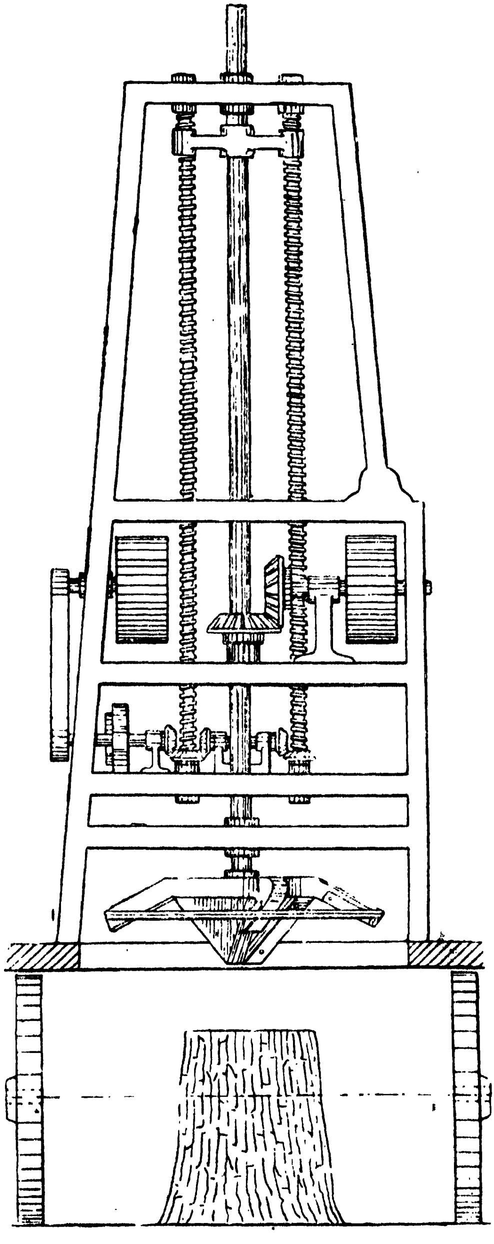
*** Note.—These reserves are for the protection of the following birds only:—Tallegallas or Scrub Turkeys, Bronzewing and all Wild Pigeons, Emus, Regent Birds, Quails.**


QUEENSLAND
and Territory of
PAPUA
1913
CORAL SEA
GULF OF CARPENTARIA
SOUTH PACIFIC OCEAN
SOUTH AUSTRALIA
AUSTRALASIA
No 2 DISTRICT
No 1 DISTRICT

27

## A STUMP-CUTTING MACHINE.

A machine for cutting down stumps 6 in. and more in diameter has been devised and patented by A. L. and G. D. Moore, of New Orleans. The machine is shown in the accompanying sketch; it is strongly built and can be attached to any tractor. In working, it is propelled to the stump and the cutter head is made to revolve at 400 revolutions per minute. The cutter head is lowered by a friction feed operated by a rocking lever. The thickness of the chips or shavings is regulated by the feed screws.



The cutter can be regulated so as to penetrate 18 in. below the surface of the ground, if necessary, so as to consume all the stump, leaving only the minor roots.

The cutter head is so formed that, with the velocity of working, the chips are thrown upwards by a centrifugal motion. The chips are guided by a hood or jacket and are blown in one direction so that they can be sacked or carted away. The principal object of the machine is to clear cut-over lands from stumps, leaving the land ready for cultivation. At the same time the stumps are cut into small chips which can be used for the manufacture of by-products such as wood pulp.

It is worked by two men, and the cost of the oil fuel is estimated at 3 dollars (12s. 6d.) per day of ten hours.—"Monthly Bulletin."

# Answers to Correspondents.

## RETARDATION OF THE CHURNING OF CREAM.

E. J. BLENEY, Dingo—

1. Mixing lime with salt for milkers would not prevent the cream from turning into butter.

Amongst the causes which retard the churning of cream, the following are to be listed:—

2. Uneven ripening of the cream prior to churning.

3. Churning cream at abnormally high or low temperatures.

4. Churning cream containing a very low percentage of butter fat.

5. Faults in the mechanism of the churn which, as a consequence, cause the cream to become "whipped" rather than the minute fat globules to be collected, as ordinarily happens during the process of churning cream.

It is impossible to make "whipped" cream give up its butter fat content by churning.

## PRUNING FRUIT TREES—PAPAWS.

A. E. OELRICKS, Mount Cotton, asks, on 7th September—

1. I have some citrus trees just coming into bearing for the first time, but they are sadly in need of pruning. Will it hurt the trees to prune them now, with the sap up, of course taking care not to cut blossoms away?

2. My mango trees are just beginning to blossom. Will it hurt them to bleed them now, or must I wait until they have finished fruiting?

3. What are the best papaws to grow? I personally prefer the dwarf kind. Can you tell me the names? Also, I have seen some very large and almost seedless papaws. Can you tell me the name of the variety; also, whether it can be obtained in Brisbane?

Mr. C. ROSS, F.R.H.S., Instructor in Fruit Culture, replies—

1. It is always better to prune while the sap is dormant, but it will not hurt your citrus trees to prune them now. If the blossoms are very numerous, no harm will be done by reducing them; the remaining blooms will set better. Relieve dense growth and prune out all weak inside wood along the branches and trunk.

2. Thin out the wood of your mango trees at once, but do not reduce the blooms too much.

3. The "Cowley" and "New Guinea" are large varieties with few seeds. The dwarf, round variety produces more seeds, but is of excellent flavour. Seeds may be obtained from Brisbane seedsmen, or Mr. Moore, Redland.

My absence from Brisbane will account for any delay which has occurred in replying to your letter.

## TREATMENT OF FISTULA IN HORSES.

JAS. WRIGHT, "Mons Visus"——

Blistering is often beneficial at the commencement, but in most cases thorough surgical treatment is necessary before recovery takes place. Why fistulas are so troublesome to treat is because the tubular passages which lead from the surface opening are lined by a false membrane. This membrane must be removed before the wound can permanently heal, and the best way to bring this about is to probe the wound, thus finding out the depth and direction of the tube or tubes; then open boldly with the knife (these tubes) and apply the following lotion on some cotton-wool:—

| | |
|---|---|
| Corrosive sublimate .. .. .. | ½ oz. |
| Methylated spirit .. .. .. | 3 oz. |
| Water .. .. .. .. .. | 3 oz. |

Apply every third day until the third application. Keep the wound clean, and apply lard or oil to the outside where the discharge runs.

## PRICKLY PEAR DESTRUCTION.

T. A. RICKETTS, Kinkabilla—

Your letter of 12th instant was submitted to Mr. Brünnich, Agricultural Chemist, who replies as follows to your questions:—

1. Arsenic is the effective ingredient. Caustic soda aids in making the arsenic more readily soluble. Salt is added, as it apparently makes the poison more effective, probably by causing a quicker diffusion through plants.

2. The solution could be kept for any length of time without altering efficacy. The same applies to powder, only this generally cakes and forms hard lumps on being kept.

3. The arsenic itself would kill the plant.

4. Washing soda may be used instead of caustic soda, only larger amounts are necessary, as the arsenic does not dissolve so quickly.

5. No special bulletin for the guidance of selectors has been issued.

## DERIVATION OF THE WORD CANADA.

"CURIOUS HISTORIAN," Tiaro—

Sir John Barrow derives this name as follows:—When the Portuguese, under Gaspar Cortereal, in 1590, first ascended the great river St. Lawrence, they believed it was the strait of which they were in search, and through which a passage might be discovered into the Indian Sea. But, on arriving at the point whence they could clearly ascertain it was not a strait but a river, they, with all the emphasis of disappointed hopes, exclaimed: "Aca nada!" or "Canada" ("Here there is nothing") —words which were remembered and repeated by the natives on seeing Europeans arrive in 1594, who naturally conjectured that the word they heard employed so often must denote the name of the country—Canada.

# The Markets.

## PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR SEPTEMBER, 1914.

| Article. | | SEPTEMBER. Prices. |
|---|---|---|
| Bacon | lb. | 8d. to 10½d. |
| Bran | ton | £6 10s. |
| Butter | cwt. | 112s. |
| Chaff, Mixed | ton | £3 5s. to £3 10s. |
| Chaff, Oaten (Victorian) | ,, | £5 10s. to £5 15s. |
| Chaff, Lucerne | ,, | £7 |
| Chaff, Wheaten | ,, | £4 15s. |
| Cheese | lb. | 7½d. to 8d. |
| Flour | ton | £9 10s. |
| Hams | lb. | 1s. 1½d. |
| Hay, Oaten (Victorian) | ton | £6 5s. to £6 10s. |
| Hay, Lucerne (Prime) | ,, | £3 5s. |
| Honey | lb. | 2½d. to 3d. |
| Maize | bush. | 3s. 1½d. to 4s. |
| Oats | ,, | 3s. 7d. to 4s. |
| Onions | ton | £9 to £10 |
| Peanuts | lb. | 3d. to 3¾d. |
| Pollard | ton | £6 10s. |
| Potatoes | ,, | £3 15s. to £6 |
| Potatoes (Sweet) | cwt. | 2s. to 2s. 3d. |
| Pumpkins | ton | £1 15s. to £2 |
| Wheat, Milling | bush. | 3s. 6d. to 4s. 9d. |
| Eggs | doz. | 8d. to 1s. |
| Fowls | pair | 3s. to 9s. |
| Geese | ,, | 7s. to 8s. 6d. |
| Ducks, English | ,, | 4s. to 5s. 6d. |
| Ducks, Muscovy | ,, | 4s. 4d. to 7s. 6d. |
| Turkeys (Hens) | ,, | 9s. to 11s. 6d. |
| Turkeys (Gobblers) | ,, | 28s. |

## SOUTHERN FRUIT MARKETS.

| Article. | SEPTEMBER. Prices. |
|---|---|
| Bananas (Queensland), per case | 12s., 15s., 18s. |
| Bananas (Fiji), per case | ... |
| Mandarins (Queensland), per case | 10s. to 12s. |
| Oranges (Navel), per case | 12s. to 15s. |
| Oranges (Seville), per case | 6s. to 7s. |
| Oranges (other), per case | 6s. to 9s. |
| Passion Fruit, per half-case | ... |
| Pineapples, per case | 6s. to 8s. 6d. |
| Pineapples (Queensland), (Queens), per case | ... |
| Pineapples (Ripleys), per case | ... |
| Tomatoes, per quarter-case | 4s. to 5s. |

## PRICES OF FRUIT—TURBOT STREET MARKETS.

| Article. | SEPTEMBER. Prices. |
|---|---|
| Apples, Eating (Tasmanian), per case | 6s. to 10s. |
| Apples (Cooking), per case | 5s. to 9s. |
| Bananas (Cavendish), per dozen | 2d. to 5d. |
| Bananas (Sugar), per dozen | 1d. to 2½d. |
| Cape Gooseberries, per quarter-case | 5s. to 8s. |
| Citrons, per cwt. | 10s. to 10s. 6d. |
| Cocoanuts, per sack | 12s. to 14s. |
| Cumquats, per case | 1s. 6d. to 2s. 3d. |
| Custard Apples, per quarter-case | 2s. 6d. to 6s. |
| Lemons (Local), per case | 6s. to 8s. |
| Lemons (Imported), per case | 10s. to 20s. |
| Mandarins, per case | 5s. to 9s. 9d. |
| Oranges (Navel), | 6s. to 8s. 6d. |
| Oranges (other), per case | 5s. to 7s. |
| Papaw Apples, per quarter-case | 1s. 6d. to 2s. 6d. |
| Passion Fruit, per quarter-case | 4s. to 6s. |
| Persimmons, per quarter-case | 2s. 6d. to 4s. 6d. |
| Peanuts, per pound | 3½d. to 4d. |
| Pears, per quarter-case | 6s. to 8s. |
| Pineapples (Ripley), per dozen | 1s. 6d. to 2s. |
| Pineapples (Rough), per dozen | 1s. to 1s. 6d. |
| Pineapples (Smooth), per dozen | 2s. to 4s. 6d. |
| Rosellas, per sugar bag | ... |
| Strawberries, per dozen pint boxes | 2s. 6d. to 7s. 6d. |
| Strawberries, per tray | 1s. 6d. to 2s. |
| Tomatoes, per quarter-case | 1s. 9d. to 6s. |

## TOP PRICES, ENOGGERA YARDS, AUGUST, 1914.

| Animal. | AUGUST. Prices. |
|---|---|
| Bullocks | £16 2s. 6d. to £17 10s. |
| Cows | £10 5s. to £12 7s. 6d. |
| Merino Wethers | 26s. |
| Crossbred Wethers | 29s. |
| Merino Ewes | 20s. 9d. |
| Crossbred Ewes | 17s. 6d. |
| Lambs | 23s. |
| Pigs (Baconers) | ... |
| Pigs (Porkers) | 43s. |

## EXHIBITION PRICES.

| Animal. | AUGUST. Prices. |
|---|---|
| Bullocks | £28 15s. |
| Bullocks (Champion) | £22 |
| Bullocks (Guessing) | £21 10s. |
| Cows (Champion) | £13 5s. |
| Cows | £12 15s. |
| Merino Wethers | 27s. 6d. |
| Crossbred Wethers | 29s. |
| Merino Ewes | 21s. |
| Crossbred Ewes | 27s. |
| Lambs | 23s. |

# Farm and Garden Notes for November.

FIELD.—Under ordinarily favourable conditions, harvesting the wheat and barley crops may now begin. Those who have oats for hay should cut it when the grain has formed, but before it is ripe, for then the plant is in its most nourishing condition. Destroy caterpillars on tobacco plants, and top the latter so as to throw all the strength into the leaves. Keep down the weeds, which will now try to make headway; earth up any growing crops requiring the operation; sow maize, imphee, setaria, kafir corn, teosinte, sorghum, &c. Plant sweet potatoes, sisal hemp, yams, peanuts, and ginger.

KITCHEN GARDEN.—Why do so few gardeners and farmers grow their own vegetables? This is a question frequently asked by visitors to the farming districts. The reason probably is, that vegetables require a good deal of care and attention, which means also a good deal of time taken from the ordinary farm work. In many cases it pays the farmer better to buy many kinds of vegetables than to grow them himself. The only vegetables grown on many fine farms are cabbages and pumpkins, not to class potatoes under the head. Many people have an idea that European vegetables cannot be grown during the hot summer months, but this is a great fallacy; the Chinese gardeners supply the towns with all kinds of vegetables, except, perhaps, cauliflowers, during the whole of the summer. It is, therefore, clear that, by constant work, plenty of manure, water, and some shade for seedlings, most vegetables can be produced during the hot months from November to March. If your ground has been trenched or deeply dug and well worked, the advantages will be seen during the coming months. It does not pay to work shallow-dug ground. When sowing and planting during this month, give plenty of room between the rows and the plants; otherwise they will be drawn up and worthless, and keep the ground open by constant forking and hoeing. Thin out melon and cucumber plants. It is a good plan to peg down the vines; they will then not be blown about by the wind; they will take root at intervals, and thus help the main stalk. Give plenty of water to tomatoes planted out last month. They should also be mulched. Sow cabbage, French beans, melons, lettuce, radishes, pumpkins, cucumbers, marrows, rosellas, &c.; and transplant for succession in calm cloudy weather.

FLOWER GARDEN.—Stake any dahlias which may be now above ground, and plant out the bulbs which were stored in a moist place. If the weaker bulbs are reserved, they will come in for autumn planting. Take up all bulbs which have done flowering, and store them in a dry place. Winter-flowering plants will have gone off almost; still, the garden should be in full bloom, and will well repay the trouble bestowed on it, and a little fertiliser given as a top-dressing will assist the plants to bloom and look well for a longer time than if they were neglected. Give weak liquid manure to chrysanthemums, and allow no suckers to grow till the plants have done flowering. Take up narcissi. Do not store them, but plant them at once in new situations. Sow antirrhinum, balsam, zinnia, summer chrysanthemum, calliopsis, and nemophila.

# Orchard Notes for November.

## THE SOUTHERN COAST DISTRICTS.

November is somewhat of an off month for fruit, as the crop of strawberries is about over; pineapples, with the exception of a few off season fruit, are not ready for marketing; and citrus fruits of all sorts, with the exception of those gown in the latest districts, are now over. Bananas should, however, be improving, particularly if the season is favourable.

The most important work of the month is the cultivation of the orchard, as, in order to retain moisture in the soil, it is essential that the soil be kept in a fine state of tilth. Where the land is liable to wash, breaks should be left between the fine-worked land, or, even better, a good break of cowpea or other leguminous crop, valuable for producing nitrogen and humus, should be grown. All fruit pests should be attended to; cyaniding can be carried out where necessary, and is especially useful now in the case of the Red, Purple, Mussel, Circular Black, and Glover Scales. Fruit fly should be systematically fought; all infested plums, peaches, guavas, or other fruits should be gathered and destroyed, so as to prevent the spread of the pest. Sucking bugs of all sorts should be gathered and destroyed, the egg-clusters, as well as the immature and mature insects, being destroyed. Hand-gathering is as good a plan as any. Fig beetles should be destroyed by spraying with Kedzie's mixture; and the egg-clusters should be destroyed whenever found.

Bananas and pineapples can be planted during the month, taking care, in the case of the pineapples, not to set out suckers that will immediately throw out a fruit, but those that will become firmly established before they fruit. Examine the vineyard carefully, and keep it well worked. Look out for Oïdium and Black Spot, and treat for same as recommended in the Orchard Notes of the two previous months.

Early ripening grapes will be reaching maturity towards the end of the month; but few, if any, will be ripe. In any case do not market too immature fruit; rather wait a few days longer, till it is fit to eat.

## THE TROPICAL COAST DISTRICTS.

The main crop of pineapples will ripen during the month; and if gathered at the right time—viz., when fully developed, but not turned colour—they will carry all right South, if carefully handled and well packed. Papaws and granadillas are still in season, and will meet with a good Southern demand; they must be packed in cases containing only

a single layer of fruit, and should be sent in the cool chamber. I am certain that a good market can be got for these fruits in both Melbourne and Sydney, particularly at this time of the year, when their winter fruits are off and their summer fruits are not yet on.

Watch bananas carefully for fly. Keep the orchards well cultivated.

Only ship good mangoes South; far too much rubbish is sent to Brisbane. Good mangoes will pay to pack properly, but the common sorts, which predominate to an enormous extent, will barely pay freight, if there is a good crop. The canning of good types of fibreless mangoes of good flavour is well worth taking up commercially in the North, as a ready sale for the canned fruits can be obtained.

As in the Southern Coast districts, all fruit pests should be systematically fought, and the orchard should be kept in a good state of tilth, as, once the wet season starts, there is little chance of cleaning up weeds and rubbish of all kinds, or of cultivating and sweetening the soil.

## THE SOUTHERN AND CENTRAL TABLELANDS.

The earlier kinds of summer fruits, such as cherries, will ripen during the month. See that, if fruit fly makes its appearance, it is systematically fought.

Look out for Codling Moth, and continue the sprayings with Kedzie's mixture.

Look out carefully for any San José scale that may have escaped the winter spraying, as, if the trees are sprayed whilst the young are hatching out, the bulk of the insects are killed and little damage is done either to tree or fruit.

The sulphide of soda spray is one of the best to use now. Keep Woolly Aphis in check, should it make its appearance, using the resin washes; or, if it and San José scale are both present, use the sulphide of soda spray.

Watch the vineyards carefully for Black Spot and Oïdium. Keep the orchard and vineyard well cultivated, so as to retain all the moisture in the soil required for the growth of the tree and development of the fruit. In the warmer parts, irrigate when necessary, following the irrigation by deep and systematic cultivation.

See that grape vines have plenty of foliage to protect the ripening fruit from sun scald, but yet not so dense a foliage as to induce Oïdium or Black Spot. Look out for Red Scale on citrus trees, and cyanide to check same. Look out for fruit fly in the early ripening fruits, and gather and destroy all that may be so affected.

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# Agriculture.

## COTTON-GROWING AMONGST PRICKLY PEAR.

There are many large areas of rich land which have been overrun by the prickly-pear, but not to such an extent as to cover the entire surface of the soil; and there are a considerable number of vacant spaces unoccupied by the pear which afford opportunities of raising a crop which does not demand the use of the plough. Such a crop is cotton. Mr. W. Neil, late of Dulacca, made some experiments with this crop amongst the pear on the Western Line last year, and the results obtained were sufficiently satisfactory to lead to the belief that with very little trouble a good crop of cotton can be raised without any other appliance than the primitive hoe. The pear in the West thrives on some of the richest soils; and where it has not taken as yet full possession, there are vacant spaces from 2 to 3 ft. in diameter on which a cotton-crop can be raised. In 1906 Mr. Neil sowed Sea Island cotton on a number of the aforesaid patches, by simply making a hole with a mattock 1½ in. deep. This was done on the 20th September. No cultivation was attempted. The plants grew to a height of over 4 ft., and produced two or three fine bolls on each branch, the bolls averaging 1½ to 2½ in. in length before opening. The cotton, which was of excellent quality, was picked on the 14th February. The only rain the plants received was from a thunderstorm in October. The cotton was picked by members of his family usually on moonlight nights, and was sold to Messrs. Joyce Bros. at 2½d. per lb. in the seed. Mr. Neil considers that on any pear land, not too overgrown, in the country between Chinchilla and Dulacca, cotton can be raised economically and profitably.

## CLEARING LAND BY POISONING TREES.

We have frequently described the method of destroying trees by "frill" ringing and poisoning. Here is a proof of the simplicity and effectiveness of this method of getting rid of small and heavy timber, as described in the Melbourne "Leader":—

Mr. D. Morris, of Bethungra Park, Illabo, N.S.W., had 2,000 acres of heavily timbered land, which he proposed to put under wheat. Under the old methods of ringing and allowing the timber to die before being grubbed out, a period of from two to three years would elapse before the land was fit for agriculture. Mr. Morris adopted arsenical poisoning, which he had previously satisfied himself was satisfactory.

A paddock containing 320 acres was closed; 1 lb. of arsenic and 7 lb. of soda were mixed to 4 gallons of water. The mixture was allowed to simmer over a slow fire for a few hours, special care being taken to prevent the water coming to a boil. Drums were then filled with the mixture, and put by for use as required. No special appliances are required for applying the poison. An oil drum fitted to a pair of wheels and a watering can is all that is necessary. A man was put to "frill" ring the timber, and after treating a dozen or more trees he took a quantity of the prepared mixture and poured it slowly into the ring, going from one tree to another with the can. In frill-ringing it is necessary to give the axe a half turn downward, so as to split the bark, and thus enable the mixture to find an easy entrance to the sap veins. The paddock having been treated as above, the stock was put back into it, it having been proved that there was no danger of stock being poisoned through eating the falling leaves.

A few days after treatment the timber has the appearance of having been rung for several months, and in about four months the timber is dead and ready to pull down. Unlike timber which has been allowed three or four years to die, the trees treated with arsenic remain sound, and are much better to pull down and use either for fencing or firewood. The paddock above described was under heavy timber, and four months later a contract was let for clearing, and the ploughs followed the clearing gang, the land being fallowed for the following season. The two valuable features of arsenical poisoning are that two years are saved in preparing the land for agriculture, and there is practically no suckering, the poisoning killing the tree down into the roots. Mr. Morris is now engaged treating other large areas of green country, and is so satisfied with the method that he has no intention of going back to the old system. Mr. Morris states that the greatest care is necessary in preparing the mixture, which must not be allowed to boil. In reply to a correspondent who asked for further particulars, Mr. Morris wrote:—"My experiments have been with small saplings up to trees over 2 ft. in diameter. I ring the bark as low to the ground as possible, and then pour the liquor around the frill ring slowly, so as to let it soak down the bark. For weeds to very small shrubs you would require a spray. There is a mixture on the market called arsenate of soda, which I am told does for the purpose, but I have not had any experience of it. One pint of the mixture will

kill a tree 2 ft. in diameter. The arsenic and soda as I use it is very strong, and would be very poisonous—that is, if you sprayed it on weeds—and would kill anything eating any of the leaves or brush. My system of bark-ringing is different, as it mixes with the sap of the tree, which is its blood. It kills the tree through the sap."

## SCARCITY OF POTASH.

The greatest potash supply of the world is found at Stassfurt, Germany, where soluble potash salts are mined in large quantities. Now that, owing to the European war, this source of supply is cut off, farmers, fruitgrowers, and others will be at a loss how to obtain the necessary fertiliser. Muriate of potash is the cheapest form of potash, and is usually a good source, except in special cases where chlorine may injure the quality of the crops, such as tobacco and oranges. For such crops, sulphate of potash or sulphate of potash magnesia should be used. Kainit is another form of potash salt containing chlorine, and is especially valuable upon sand soils. Kainit is valued not only for its fertilising properties, but for its power of destroying insect life and curing plant diseases.

Wood ashes are also a valuable source of potash, but the amount of potash contained in them is small and variable. All vegetable matter on the farm—such as wood, weeds, woody shrubs such as lantana, &c.—should be utilised for the purpose of obtaining potash. Plants cannot grow without it, and we have been asked if salt or soda could supply its place. One fact has been clearly demonstrated by scientific research in plant life:—"Soda cannot take the place of potash as a plant food, neither can salt." Plants are indifferent to the presence of soda. They can prosper when soda is entirely absent, but no amount of soda will produce growth when potash is wanting.

It should be noted that 1,000 lb. of corn stalks will yield 17·5 lb. of potash; bean or sunflower stalks, 20 lb.; grape vine cuttings, 40 lb. Tobacco stems contain 5 per cent to 6 per cent., and some midribs of tobacco leaves as much as 8 per cent. We have seen vineyards in Switzerland manured with chopped vine cuttings.

Now, as far as salt is concerned, Storer says:—Of sodium compounds considered as fertilising agents, comparatively little need be said. Methodical experiments have shown that sodium is apparently not essential to the life of agricultural crops. Crops can grow perfectly well without it; or, at the most, they need so small a trace of soda that enough can always be obtained from the supplies found in the soil, or even in the air. The soda usually found in the ashes of plants is accidental and non-essential. The old notion that soda could replace potash in the plant has been disproved; yet common salt is often found to do good service as manure. The explanation of this fact seems to be that salt acts indirectly. It effects the decomposition of substances already in the soil, and sets free from them some things which are needed by plants. It is now

known that, with many soils, potash can be given to the crops by applying common salt or any other soluble sodium compound to the land, the action being that the salt pushes out lime and potash from the surface soil, sending them down to where the roots of the crops are growing. Still, after all, it would be usually better policy to apply a potash compound directly, rather than to count upon the indirect action of salt (chloride of sodium) or of any other sodium compound.

As has been shown, common salt is not in itself a fertiliser, but some plants—such as asparagus, mangolds, beet, and potatoes—benefit directly from its application. Mangolds particularly thrive on salty or alkali soil. This was very marked on one of the State Farms—the Hermitage, near Warwick, where, some years ago, there were several alkali patches on which neither wheat nor millets would thrive. Then mangolds were tried, and these came to perfection, absorbing large quantities of salt. It is said that their roots will take up as much as 90 lb. of salt per acre. But, even so, experiments at Rothamsted have pretty well proved that the increased crop after a dressing of salt is not due to the inherent liking of mangolds for this substance, but to their dependence on abundant supplies of potash, because, as above stated, the soluble salt will bring into solution the reserves of insoluble potash in the soil and manure.

It was reported some months ago that a German firm was constructing a factory at Haffradie, in the neighbourhood of Reykjavik, the capital of Iceland, for the manufacture of a new fertilising material with potassium as its chief component. The raw material consists of a kind of potassium felspar, resembling lava. This will be reduced in electrical furnaces together with coal and iron. The products of these furnaces are of two kinds—viz., a silicious iron, which is saleable to steel works, and a potassium slag, which is first subjected to a crushing process, and then brought into the market under the name of "elektro-kalium," as a manure. The process was invented by a Swedish engineer, Mr. Alex. Lindblad, who has a factory of his own in Sweden—viz., the Sansta Electrical Melting Works, at the Hagge Station. Elektro-kalium is not to be confused with the material that has been brought into the market in Germany under the name of "feldspar flour," which is merely crushed feldspar.

Whether the present war will put a stop to this enterprise or not remains to be seen. Iceland belongs to Denmark; and as Denmark is a neutral State, it is probable that the work will be continued, and that, after the war, the product, which it is said will be remarkably cheap, owing to its being produced by electric power, will be placed on the market. Potash manures for orchardists are indispensable, and must be had from some source.

## BOY AND GIRL CORNGROWERS IN THE UNITED STATES OF AMERICA.

The Editorial Bureau, Panama-Pacific International Exposition, writes:—

Nine thousand young Burbanks of the cornfields—boy and girl delegates to the Convention of the National Top-Notch Farmers' Club—are

expected to visit the Panama-Pacific International Exposition in a body in 1915. These delegates will represent every great corn-producing county in thirty-three States of the Union, three representatives being chosen from each county by the governor of each State.

Each of the 9,000 delegates to the greatest exposition ever held in the world has earned the honour by producing a record-breaking acre of corn, the greatest food material in the world, running upwards of 100 bushels to the acre. Each will bring with him his unique credentials in the shape of 10 ears of his prize corn to place on exhibition, in competition with the world. If laid side by side, these ears would extend for a distance of 4 miles—enough to put a golden girdle around the outside wall of the entire exposition grounds.

No one is eligible to membership in the Top-Notch Club who has not produced over 100 bushels of corn to the acre; and when it is remembered that 50 to 70 bushels formerly were regarded as a maximum, the great work which these young promoters of intensive cultivation are doing to educate their parents may be appreciated. The president of the club is the boy who holds the highest record. This year it was W. I. Dunson, of Alexander City, Alabama, who earned his office by producing over 232 bushels on an acre, and he will hold the office until such time as someone, by better methods of selection of seed and cultivation, takes from him both the record and the office. This is the merit system, plus.

Each corn-growing State is entitled to a vice-president, provided that someone in the State gets over into the 100-bushels to the acre class. So far, 33 States have qualified. Consequently, thirty-three young fellows have acquired the offices of vice-president through their own efforts—pull and the support of friends being at a discount. Each of these farmer-officials holds the record in his State. As will be seen, the Southern boys rather put it over their fellows in the Northern corn belt. Some of these vice-presidential top-notchers have exceeded 150 bushels per acre. They represent the following States:—Mississippi, 214·9 bushels per acre; Oregon, 192·1; North Carolina, 190·4; Georgia, 181·7; Michigan, 175; Arkansas, 172·6; Florida, 170·2; Texas, 167·5; Virginia, 167; Tennessee, 163·5; Utah, 156 bushels per acre.

While Alabama has won the presidency by scoring the largest yield, Illinois scored the greatest number of individual records, 214 young corn-growers in that commonwealth having qualified for membership. Singularly enough, Mississippi, which won the second highest score, also has the second largest number of top-notch growers, with 80 farmers who have qualified.

These delegates will number 9,000. In addition, a large number of members of their families and other progressive farm boys and girls—for many of these experts are girls—will join the army of productive soil-tillers at the exposition. Each of these delegates will assemble an exhibit of the best of his 1914 corn at the State Fair in his State, in competition with the displays of others. Each will bring with him to

San Francisco an exhibit of at least 10 ears of this prize product. At the Convention papers will be read and addresses delivered by the boys and by many agricultural experts from all over the world.

There are something like 5,000,000 of our population engaged directly in the production of corn, while about half the people of the United States are interested more or less in the production and betterment of this greatest of our farm crops, the other half being consumers. For these reasons the meeting of this army of young experts is regarded as of immense importance as a means of solving one of the most difficult problems of industrial economy—the problem of making the food supply keep pace with the increase of population, as well as of demonstrating that there is both honour and profit in getting back to the soil and staying there.

Among the important conventions which the corn-growers may attend at San Francisco as a means of broadening out their farm education are the following, many of which will be accompanied by up-to-date exhibits:—The International Agricultural Convention; the American Breeders' Association—breeders of better animals, plants, and people; the Association of Agricultural Colleges and Experiment Stations; the U.S. Bureaus of Plant and Animal Industry; the International Congress on Marketing and Farm Credits; the American Society of Animal Nutrition; the World's Alfalfa Congress; the International Potato Congress, with a potato-growing contest; the International Good Roads Congress; the International Congress of Thrift; the Viticulturists' Congress; the National Drainage Congress; and numerous congresses of horticulturists, varied industries, and stock-breeders, with international egg-laying and sheep-shearing and flower-growing contests.

## THE SOURCE OR SOURCES OF SUPPLY OF ARTESIAN WATER.

From the very interesting Report (No. 2) of the Members of the Second Interstate Conference on Artesian Water, held in Brisbane in July last, we take the following extracts:—

When taking evidence from pastoralists and others in a number of localities in Queensland, we were much impressed by the general misapprehension which evidently prevails in regard to the actual source of the artesian water. There can be no doubt that this misapprehension has, to a great extent, been caused by the circulation of certain recent literature which, in view of its effect, can only be described as pernicious.

It is not to be expected that those persons whose success in pastoral pursuits depends upon the use of artesian water will adopt the best means to assist in conserving the supply unless they possess an intelligent conception of its source, and without that assistance it is inevitable that the depletion of the basin will be greatly accelerated. We therefore deem it advisable to publish at this stage a brief statement, in popular language, of the facts which have been accepted by leading scientific

men as accounting for the occurrence of artesian water in the principal European and American basins, where geological conditions similar to those which we have recognised in the Great Australian Basin undoubtedly prevail.

The primary source of the water is the rain which falls upon the exposed surface of certain beds of porous sandstone, by which it is absorbed, and by which it is conveyed to lower levels in the direction in which the beds of sandstone dip. In Southern Queensland, for example, there is a belt of porous sandstone to the north of Roma, and these rocks readily absorb the rain which falls upon them and are therefore recognised by us as the intake beds of this portion of the basin. They have a gentle dip to the south, and the water which they absorb is therefore transmitted very slowly in that direction, under the Rolling Downs country. The intake beds outcrop along the summit of the Dividing Range at a minimum altitude above sea-level of 1,260 ft. (to the north of Blythdale), but the altitude of the sites of all the artesian wells which are fed by these intake beds is considerably less than that figure. It follows, therefore, that the water in any bore to the south of Blythdale is under a hydraulic pressure or " head " equivalent to the difference between the altitude of the bore site and the altitude of the intake beds, less an allowance due to the friction or resistance which the sand grains of the rock offer to the passage of the water. The head or pressure just referred to is undoubtedly the principal cause of the rise of the water above the surface, and if a long vertical pipe be erected above the mouth of the bore casing it will be found that the flowing water will come to rest at a height above the surface which is approximately equal to the height calculated from the observed pressure.

The depletion of the artesian basin must result (and has already resulted in a number of cases) in the reduction of the head, and a corresponding falling off of the yield from flowing bores; moreover, the observations made by the hydraulic engineers in charge of the bores absolutely confirm the conclusions of the geologists in regard to the structure of the artesian basin, the source of the water, and the cause of its flow. It should be understood that the general rate of percolation of the water in the porous rock is very slow, but the rate increases rapidly as the water approaches a bore-hole. For example, at the bottom of a bore the water rushes in with a very high velocity, which, however, decreases rapidly with increasing distance from the bore, so that at a very short distance from it the rate of movement of the water in the sandrock may amount to less than 1 ft. per day.

The artesian flows in Central and Northern Queensland are also accounted for by geological conditions similar to those already described. The intake beds, consisting of a belt of porous rocks extending along the slopes of the Dividing Range, dip in a westerly direction under the Rolling Downs, and the rise of the water is due to the greater altitude of the intake beds as compared with that of the bore sites.

The following sketch section will perhaps assist in making our description clear:—

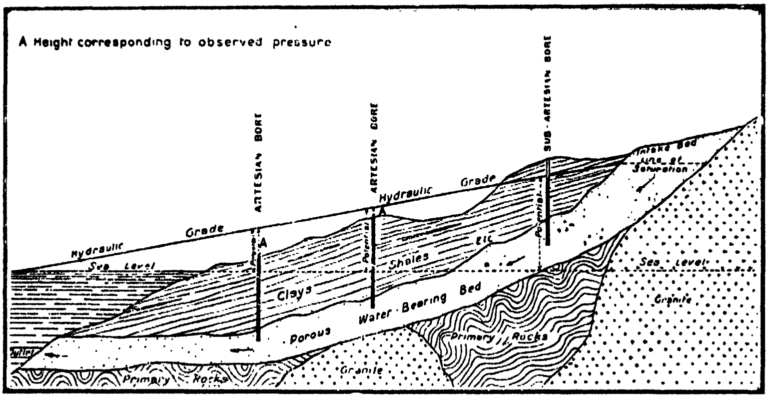


PLATE 70.—GENERALISED SECTION OF AN ARTESIAN BORE WITH AN OUTLET TO THE OCEAN.

## THE LOWER LIMIT OF WATER-BEARING STRATA.

So far as our present knowledge extends, there is no evidence that the artesian water of the Great Australian Basin comes from any geological horizon which is lower than the Trias-Jura sandstones. There is no reason why the permo-carboniferous sandstones, some of which are fairly porous, should not be capable of absorbing and transmitting water, but we are not aware of any instance where they occur along the eastern margin of the basin to such an extent as would enable them to act efficiently as intake beds, nor do we know of any bore within the limits of the basin which has derived its flow from rocks of this age.

## THE DIMINUTION OF SUPPLY FROM BORES AND REASONS FOR SAME.

DECREASE OF FLOW IN NEW SOUTH WALES.—In practically the whole of the bores sunk in New South Wales the flow is decreasing year by year. On 30th June, 1914, there were 388 flowing bores in this State, of which 351 have been gauged at some period since they were sunk.

Figures have been prepared showing the decrease in flow in all the bores which have been gauged from 1903 to 1913; they are as follow:—

| Period. | Number of Bores Gauged. | Total Decrease in Flow between First Year of Period and 1913. | Average Annual Decrease in Flow. |
|---|---|---|---|
| | | Per cent. | Per cent. |
| 1903-13, 10 years ... ... ... | 21 | 38·0 | 3·8 |
| 1904-13, 9 years ... ... ... | 11 | 53·9 | 6·0 |
| 1905-13, 8 years ... ... ... | 45 | 45·9 | 5·7 |
| 1906-13, 7 years ... ... ... | 75 | 39·1 | 5·6 |
| 1907-13, 6 years ... ... ... | 134 | 33·2 | 5·5 |
| 1908-13, 5 years ... ... ... | 71 | 27·3 | 5·5 |
| 1909-13, 4 years ... ... ... | 132 | 28·1 | 7·0 |
| 1910-13, 3 years ... ... ... | 174 | 19·2 | 6·4 |
| 1911-13, 2 years ... ... ... | 152 | 13·7 | 6·9 |
| 1912-13, 1 year ... ... ... | 202 | 7·7 | 7·7 |

For the period 1903-8 the average rate of decrease for all bores gauged may be taken as about 5½ per cent. per annum, while for the year ending 30th June, 1914, it will probably be about 8 per cent. per annum.

The percentage decrease for 1912-13 is so high that the fullest inquiry appears desirable as to the reasons for the decrease in flow.

In an appendix are given particulars of 11 bores in New South Wales which have been cleaned out, but not deepened. The result of cleaning out these bores has been most disappointing. With the exception of Coolabah and Goondablui Bores, the increase in flow has been small, and in all cases the flow has since decreased.

The inference to be drawn is that the decrease in flow in these cases prior to cleaning out was probably due to loss of pressure, rather than to obstruction by caving or other local causes. This view is supported by the evidence obtained with the use of a compressed air lift tried at Bellata Bore in the Moree district. The original bore at this place was sunk in 1896. When gauged, in May, 1903, the flow was 417,000 gallons per day, but in October, 1911, this had fallen to 57,168 gallons per day, and in February last, when the air lift experiment was made, to about 23,000 gallons per day. Compressed air was applied through a 1½-in. pipe, at a depth of 146 ft. below the surface, when in a few minutes the flow increased to 397,000 gallons per day, thus showing conclusively that there was no obstruction to the flow in the lower portion of the casing, and that the falling off was due solely to decrease in pressure.

In an appendix is given a list of 14 bores, originally flowing, which have now ceased to flow. By reference to the map on which the amended boundary of the flowing supply has been shown, it will be seen that these bores are all on the eastern and southern edges of the basin.

Attention is particularly directed to Bullagreen Bore. The flow from the original bore in 1906 was 351,366 gallons per day, but in January last the water stood at 2 ft. below the surface. No water was met in this bore below 1,174 ft. A second bore, completed last month to a depth of 1,187 ft, about 2½ miles from the original bore, gave a supply which barely reached the surface.

Decrease of Flow in Queensland.—Of 977 flowing bores in Queensland 124 have been remeasured, and these show that during the last fifteen years there has been a decrease of 40 per cent. in the aggregate flow. It is, of course, possible that the abovementioned reduction in flow may in some cases be due to local causes, such as choking of the bore, casing troubles, &c., yet, in view of the fact that measurements of pressure, which have been made in many of the bores referred to, show a marked decrease in each case, it is reasonable to suppose that the general diminution of flow is referable to the same causes in Queensland as have been so clearly shown to be operative in New South Wales.

When we come to consider the actual causes of the general diminution of flow in two of the States, we are unable to escape the conclusion that the primary cause is the overdraught which has been already made upon the accummulated supply of the Great Australian Basin by the undue multiplication of uncontrolled bores.

Many of the witnesses examined by us fully admitted that future occupants of Crown lands as well as the present holders have rights in

the artesian supply. On the other hand, there were some who took a purely selfish view of the situation, and who insisted that the Government have no right to restrict in any way whatever the use (or abuse) of the water by those who have incurred the expense of putting down bores. We hold an entirely different view of the case, and think that, inasmuch as the artesian supply is a national asset, every member of the community has an interest in its conservation. We venture to urge, therefore, that no person should be allowed to put down a bore unless he be prepared to observe the precautions necessary to minimise waste or leakage.

In our opinion these precautions should include—

(1) The choice of a site where the surface level will admit of the obtaining and use of a sufficient supply without waste.
(2) The proper construction and casing of bores.
(3) The seating of the outside casing in an impermeable stratum in such a manner as will prevent the escape of the water outside the casing.
(4) The partial closing down of bores where the whole of the supply cannot be used by the landholder, and a reduced flow would meet his requirements. This provision, however, should not be applied in cases where there is a probability of its prejudicially affecting the bores.

# MARKET GARDENING.

## RHUBARB.

Complaints have reached us from two or three farmers that, although they obtained very fine rhubarb roots from nurserymen in Brisbane, the results have been disappointing owing to the stalks not obtaining any height. As rhubarb is grown solely for its leaf stalks, it is essential that these should be induced to grow to the most complete development, and to this end a deep and very fertile soil is essential. A soil of a somewhat clayey nature, and inclined to be moist, is best adapted to this crop, as it suffers quickly from drought. Depth of soil is of the first importance, as the large roots need plenty of room for development. Good rhubarb cannot be grown except on very rich soil. There is no danger of getting it too rich. Heavy applications of stable manure make the best possible fertilisation; but, in its absence, a fertiliser containing available phosphoric acid (8 per cent.), potash (7 per cent.), nitrogen (3 per cent.).

No plant responds more liberally to judicious watering than rhubarb, and, in dry weather, irrigation gives surprising results in the way of increased yield and general vigour of the plants. Water, then, should be vigorously used when necessary, but, at the same time, it is not well to overdo it, and thus make the ground sodden. A heavy top-dressing of manure should be applied in the winter, and forked in in the spring, care being taken not to break or disturb the roots in any way.

# Pastoral.

## HOW THE WAR WILL AFFECT THE WOOL MARKET.

Writing on 7th August, the London correspondent of "The Pastoral Review" thus discusses the prospects of the wool market:—

"How changed is the scene compared with a month ago! At that time the sun of prosperity was in the heavens, hardly a cloud darkened the horizon, and everything indicated a continuance of the high values ruling for Australian merino wools. We are not disposed to write in a pessimistic tone, but the outlook is black indeed. Somehow wool has a happy knack of righting itself, and when everything has been uninviting, and the outlook anything but cheerful, the raw material has always stood upon its feet, and to-day we are hoping for the best. At the same time the biggest calamity has befallen European nations that we have ever seen, and everything is in a state of chaos. England has joined issues against Germany. In the best-informed circles this has for some time been regarded as inevitable. Let the reader soberly think for a moment that England, France, Belgium, Germany, Russia, Austria-Hungary, and Servia are all engaged in war, and he has a scene before his eyes the like of which has never been known in the history of the world. It simply means that the worst has come to the worst, and how wool will fare no man living knows. One could have formed some reliable opinion as to the likely course of values if even Great Britain had preserved the isolation which many had been hoping for; but with Germany invading Belgium, it seemed as if neutrality no longer could be observed. It therefore means that only one important consuming country in the wool world is left out, America being that favoured nation. To the end of the July series, 1914, Continental buyers took 1,607,000 bales out of a total of 2,486,000 bales.

"What Australian pastoralists want is an unimpaired market, but we are afraid that a ruinous war cannot but cripple the purchasing and consuming capacity of both France and Germany, two of the best customers Australia has enjoyed for her merino wools. Of course, a good deal can happen before this letter appears in print, and we are mentioning these facts in passing in the hope that the next six weeks will not produce any really disastrous conditions which will directly and adversely affect the next Australian clip, but we must confess having some grave fears. All the same, the wools are there, and it is well known that for producing men's and women's wear fabrics they stand first, and it only needs a healthy trade to see them availed of as much as ever by the spinners and manufacturers of Europe.

### WAR REQUIREMENTS.

"In times of war wool is one of the principal commodities that is requisite, and before this letter is in print we are certain to see repeated a good deal of the history of the past. During the South African and

the Russo-Japanese wars wool was in the van, and that is what many expect again. Let one just think of how it enters into the equipment of any war. First, we have a man's outfit—namely, his uniform. That fabric must be made of all wool—at least all English soldiers' outfits, as well as, we believe, those of France and Germany are—because nothing but an all-wool fabric, well made and well milled, will stand the wear and tear of war. There is also his blanket, which is a thick, well-made fabric. Then comes his other equipment—namely, his underclothing, and some very good shirtings are demanded by the British Government. Rugs, stockings—in fact, many things—are required into which wool largely enters, and the majority in this country can see that a big struggle like the one just commencing may mean a big demand for wool, and it is only on these lines that prices can hope to be maintained. In Sydney last week some evidence of the trouble was seen, when Continental buyers had all their limits withdrawn, and prices dropped 10 per cent. It is a good thing that there are no sales in London; otherwise we should certainly have seen a partial slump, owing to the purchasing power of many firms being completely cut off, and quotations absolutely withdrawn.

## THE OUTLOOK.

"Things have been reduced to such a state of chaos that what to say about the future we do not know. What can we say? Between now and the middle of September, when this letter should appear in print, very much can happen. Some think that the war will be short-lived; others think that next Christmas will dawn before it is finished. Everybody hopes not. We cannot see anything but lower values for the raw material. Some are believing that the British and other Governments will need so much khaki and other war materials that big weights of wool will be required which will sustain prices, but that remains to be seen. War has always had a crushing effect upon business; and with the present high prices of food throughout all Europe, how can anyone have anything left wherewith to buy clothing materials. There will be millions of families so impoverished by the terrible struggle that they will be compelled to go shabby; in fact, in the race between the belly and the back, the former always wins. We are not pessimistic by any means, but the bright cloud has been completely turned to one of blackness, and the outlook for the approaching new Australian clip is by no means of the best. The British Government has determined to help trade and commerce as much as possible, and West Riding spinners and manufacturers, at an important meeting held yesterday on Bradford Exchange, decided to do their very utmost to run their mills at least three days per week. Their intentions, no doubt, are good; but can they be carried out? Whatever happens, we cannot see the boom that some are forecasting similar to what took place in 1871 to 1873, when the Franco-Prussian war finished. However, we are hoping for the best, and while no doubt good prices will be forthcoming, yet, to be candid, we cannot see that merino woolgrowers can reasonably expect to approach recent values when the next Australian clip becomes available. The best thing that the trade can do is to remain calm, look on and sit tight, and that is the policy of the West Riding trade to-day."

# Dairying.

## THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF SEPTEMBER, 1914.

| Name of Cow. | Breed. | Date of Calving. | Total Milk. | Test. | Commercial Butter. | Remarks. |
|---|---|---|---|---|---|---|
| | | | Lb. | % | Lb. | |
| Nellie II. ... | Shorthorn... ... | 20 July, 1914 | 1,137 | 3·6 | 47·97 | |
| Miss Edition | Jersey ... ... | 10 July ,, | 725 | 5·5 | 40·12 | |
| Lady Lie ... | ,, ... ... | 22 Aug. ,, | 580 | 5·6 | 38·40 | |
| Madam Melba | Holstein ... ... | 8 Sept. ,, | 831 | 3·8 | 36·97 | |
| Sweet Meadows | Jersey ... ... | 28 July ,, | 571 | 5·2 | 35·06 | |
| Lark ... | Ayrshire ... ... | 27 July ,, | 842 | 3·5 | 34·46 | |
| Bee ... ... | Jersey ... ... | 3 July ,, | 620 | 4·7 | 34·34 | |
| Bluebelle ... | ,, ... ... | 27 May ,, | 602 | 4·8 | 34·07 | |
| Miss Bell ... | ,, ... ... | 25 Sept., 1913 | 540 | 5·2 | 33·15 | |
| Davidina ... | Ayrshire ... ... | 17 July, 1914 | 826 | 3·2 | 30·81 | |
| Lady Margaret | ,, ... ... | 19 June ,, | 692 | 3·8 | 30·78 | |
| Countess of Brunswick | Shorthorn... ... | 26 July ,, | 714 | 3·6 | 30·05 | |
| Auntie ... | Ayrshire ... ... | 26 June ,, | 663 | 3·8 | 29·50 | |
| Lady Melba | Holstein ... ... | 6 Mar. ,, | 718 | 3·5 | 29·36 | |
| Burton's Lady | Shorthorn... ... | 23 July ,, | 728 | 3·4 | 28·90 | |
| Lady Athol | ,, ... ... | 10 July ,, | 625 | 3·2 | 23·31 | |
| Lady May ... | Ayrshire ... ... | 4 May ,, | 584 | 3·4 | 23·17 | |
| Nina ... | Shorthorn... ... | 5 April ,, | 538 | 3·4 | 21·35 | |
| Lennie ... | Ayrshire ... ... | 15 Aug. ,, | 525 | 3·4 | 20·84 | |
| Cocoatina ... | Jersey ... ... | 20 April ,, | 302 | 4·8 | 20·48 | |
| Lady Maid... | Shorthorn... ... | 17 Mar. ,, | 389 | 4·4 | 20·14 | |
| Gretchen ... | Holstein ... ... | 6 May ,, | 577 | 3·0 | 20·13 | |

Ration feed: 20 lb. panicum ensilage and 2 lb. of bran per cow.

## PEANUTS AS PIG FOOD.

The value of peanuts for feeding pigs has apparently not yet been realised by Queensland farmers; and if any of them have experimented with them, the results have not been published for the benefit of those engaged in the very profitable business of pig-raising. According to the latest available statistics issued by the Government Statistician, there are only 140,045 pigs in the whole State; and this represents a decrease of 3,650 on the numbers for the previous year. This decrease, however, is more than counterbalanced by the fact that nearly 10,000 more pigs were killed in 1913 than in 1912. There are seven factories which confine their work to handling swine only, while others deal with other stock as well. In these factories, during 1913, 172,084 swine were slaughtered; but in this number are included those slaughtered by the farmers.

The number of cultivated holdings in the State is 23,472; and the area under cultivation is 920,010 acres (or about 309 acres per holding),

out of which large area only 163 acres are returned as being under peanuts; and the average number of pigs per holding is only six.

An acre of peanuts will yield from 1,500 to 2,000 lb. of nuts (2,420 lb. per acre were produced this year on one of the State Farms). It has been shown by Professor Cottrell, a pig-raiser in Texas (U.S.A.), that it requires less than 3 lb. of peanuts for each 1 lb. of gain on pigs that weighed from 40 to 50 lb. at the start. At the Arkansas Experiment Station, an acre of ripe peanuts pastured by hogs made 1,252 lb. of gain; while an adjoining cornfield, yielding 30 bushels to the acre, only made 436 lb. of gain per acre on hogs. At the Alabama Station with corn charged at 70 cents (2s. 11d.) a bushel, each 1 lb. of gain on hogs fed with corn alone cost 7·63 cents (3¾d.); while the cost per lb. when they were fed corn, and kept on peanut pasturage, ranged betwene 1·85 cents (less than 1d.) and 2·28 cents (1¼d.).

It is little over four years ago since American farmers in the south-west began to turn their attention to peanuts, which, up to the year 1909, they had treated as unworthy of notice. Since then the development has been very rapid. Five years ago there were, as in Queensland to-day, only a few experimental plots here and there over the country in one county. The following year 3,000 acres of the Spanish peanut were put in; then, 5,000 acres; and now the estimated area is 15,000 acres. Several other counties in Oklahoma have followed suit. And the major portion of the crop is devoted to pig-feeding and oil-making. There is, undoubtedly, a good opportunity for a great expansion of the pig-breeding industry, as the bacon factories have difficulty in obtaining a sufficient supply of pigs to keep them going at full pressure. This deficiency might be made up by the cultivation of peanuts, which have been proved to be far superior to corn, when fed in conjunction with other foods, in promoting rapid growth and considerably increased weight as compared with the results from other food.

## PASTEURISATION OF MILK.

By G. SUTHERLAND THOMSON, F.R.S., &c.

Pasteurisation is a process of heating liquids which derived its name from the great French scientist, Pasteur, who was the first to discover the death-dealing action of heat on micro-organisms in liquids. Pasteurisation is frequently confounded with sterilisation, which claims to completely destroy bacteria by the action of high temperatures. In some instances heat is required much beyond the boiling point of water before germ spores are killed. Some organisms can withstand a temperature exceeding 300 deg. F., and others are active for months at temperatures below freezing point. Fortunately, the majority of pathogenic or disease-causing germs are of the common non-spore-making class, and offer little resistance to heat.

When milk is raised above boiling point for thirty minutes it is termed sterilised; but sterilisation has a detrimental effect upon the milk solids, decomposing the sugar, coagulating the albumen, partially

decomposing the casein, and rendering insoluble the lime salts. Sterilisation and pasteurisation can be done upon the intermitten process; lowering and raising the temperatures afford the ferments an opportunity of developing, followed by death at their weakest moments.

It is generally believed that scalding and rapid cooling are all that is necessary to destroy bacteria, and ensure for the milk a high keeping property. Pasteurising and slow cooling will give to milk increased preservation, as the following test will show:—

Fifty gallons of mixed milk were pasteurised at a temperature of 160 deg. F. One half of this quantity was immediately refrigerated to 40 deg. F., and passed into 15-gallon churns. The other half was conveyed direct from the pasteuriser into two churns of similar capacity, which were standing in a vat of chilled water. The lids were put on the four cans, and twelve hours after the milk was pasteurised tests for acidity were made. The refrigerated milk showed a higher degree of acid, and a lower degree of bacterial purity. Further examinations proved conclusively that the unrefrigerated milk possessed higher keeping qualities. The writer attributes this to the cooking to death of the bacteria, and by the suffocation, so to speak, of the aerobic germs through the absence of air. Where the milk is pasteurised and immediately afterwards refrigerated, the heat is not sufficient to destroy the bacteria, and the cooling process provides air for the multiplication of the organisms that survive the scald.

Milk pasteurised and cooled in the cans for household purposes has not a cooked taste as one might suppose.

Nothing is more urgent in connection with the food of a nation than the purity and wholesomeness of the milk that enters so largely into the diet of young and old, rich and poor. The cry is for a pure and healthy supply, and efforts are now being made in the cities of the Empire to reform the industry. Who is to blame for an unclean milk supply of any country, city, or town? Is it the farmer, the retailer, the consumer, or all of them? Upon each rest responsibilities, but the State is the guardian of the public in food supplies. Year in and year out, one reads of the danger of impure milk, of the fading confidence of the consumer in his supply; but, in many countries, a poor effort has been made to give the public a feeling of real safety in the milk upon which the lives of children and the sick so much depend. In Britain, with her boasted laws of civilisation, her great seats of learning, and commercial status, little has been accomplished to put the milk supply upon a healthy basis. And it is only recently that the use of chemicals (poisons) to preserve milk was made prohibitive in England. It is perhaps well for England that the death-roll among infants, through the indiscriminate use of preservatives, cannot be estimated. Great as their loss has been, there are others to be considered. State negligence of the interests of the dairy farmer has inflicted upon him severe penalties, to the gain of foreign imports. The condensed milk business, for example, flourishes in England, but the raw material does not come from the British cow; condensed milk is imported principally from continental countries, where rigid laws have been enforced by Governments to raise the purity and general quality of the milk from which the condensed article is

made. Those who have travelled in Switzerland cannot fail to have observed the power the State exercises over the milk supply, and for what reasons, might we ask? Firstly, because experience has proved that an ounce of tainted milk would ruin the whole making of the condensed product, with the inevitable result that the industry would suffer if the State neglected to guard the interests of the producer; and secondly, England, with her fine lands and ideal conditions for dairying, is one of Switzerland's best patrons. To retain her confidence in the virtues of condensed milk is only by the vigilance of the Swiss Government in keeping the supply pure and wholesome. British consumers of milk are indebted to Switzerland, and no one has higher praise than the writer for the dairying industry of that splendid little country.

## MILK AND DISEASE.

This subject is receiving a good deal of attention at present, and perhaps one is correct in saying that no more important question affecting the health of people calls for the consideration of all parties. The milk supply should be put on a footing that will restore the inplicit faith of the public in the purity and value of the product as an indispensable article of food.

Having had occasion to make a study of milk problems in different countries, and having been privileged to conduct a number of official investigations connected with the milk supply, the writer will give a frank opinion on some phases of milk and its relationship to disease. It must be admitted that milk is a medium for the conveyance of tuberculosis to man, and the danger is increased when cows suffer from the disease in the mammary organs. Fortunately, the percentage of such cases is not large, and the possibilities of milk becoming infected with tubercle bacilli when the udder is healthy need not cause anxiety. Experience has shown that the contamination of milk with pathogenic bacteria, including the tubercle bacilli, can be traced to the carelessness of milk consumers, as well as to unhealthy cows. . . . If an inquiry were made into the way milk is kept and treated by the average householder, startling revelations would follow. No one would dare dispute the fact that this product is kept in jugs and receptacles that are, bacteriologically speaking, breeding grounds for microbes, and the placing of these vessels outside the doors of householders at night time to receive the morning milk is much to be regretted. . . . Pasteurisation is a valuable protective measure, but it must be admitted that pasteurisation will not remedy the chief evils of the milk supply. . . . Although the writer is a supporter of pasteurisation under common-sense conditions, it is known that the application of heat reduces the health-giving and digestive properties of milk, and heated milk that has become stale is positively dangerous to the consumer, while raw, clean milk, with its varying percentages of lactic acid, possesses valuable medicinal properties. In the Near East, where acid milk is the national drink of the Bulgarians, the observations of the writer proved the tremendous claim healthy raw milk has over the pasteurised product. But, in large cities abroad, and where the summer heat is extreme, and the deterioration of milk hastened, pasteurisation is indispensable.

# The Horse.

## THE HORSE ON THE FARM AND IN WAR.

There is no denying the fact that in our cities and towns the horse has, to a very large extent, been superseded by motor-cars, motor 'buses, and motor-lorries. Even in the bush and on the Western plains, the usual horse coaches have been discarded in favour of motor vehicles. But this does not imply that the day of the horse is over. On the contrary, the demand for horses of certain classes is as great as ever. Notwithstanding the employment of motor power on the farm in some cases, the fine, strong, active farm horse is as necessary and in as much evidence as before the advent of the former power. On stock farms and cattle stations no motor vehicle can take the place of the stock horse; neither can the machine be utilised by overland drovers from distant stations to the nearest railways. Then we come to the demand for horses for military purposes, such as for cavalry, mounted infantry, field artillery, army transport, ambulance, &c. Tens of thousands of horses for these purposes are required even in times of peace. What must be the number required during such a war as the present European war now in progress, when every arm of the service is brought up to a war footing? Not only are thousands of horses killed during the course of pitched battles and in countless minor engagements, but disease, starvation, and overwork carry off many more. It has been said that in the Austrian Army an epidemic of glanders has occurred amongst the horses—a disease fatal not only to the animals, but dangerous to the men who tend them. Remounts for all the belligerents will be in great demand. As is pointed out in an English journal, in by-gone days it was possible to fall back on cab horses, 'bussers, trammers, and the like, but these have practically disappeared from the streets, and so cannot be subsidised, no matter how great the need.

The "Live Stock Journal" for 31st July has the following on

### THE HORSE'S RIVAL.

In the showyard horses are as fascinating and as valuable as they have ever been, which is proved by the number of people who make a point of watching the judging at all of the horse rings; while the crowds which patronise shows only for amusement will desert the other parts of a large showyard in order to witness the jumping and driving competitions, which alone make it worth while to erect a grandstand.

It is therefore evident that the horse holds first place in the minds of English people, and that a show without horses would be an exceedingly

tame affair in the eyes of those who attend, seeing that the horse classes are those which they are willing to pay for seeing.

If we pass from the showyard to the street, however, the position and the prospects of the horse are far less secure, for the reason that the noble animal is to some extent superseded by mechanical vehicles which leave the horse-drawn conveyance far behind when speed is the desideratum; but if a safe, as well as a smart, turnout counts for anything, the one drawn by horses, or, at least, a horse, must still take the place of honour, seeing that these horseless vehicles not only go "the pace which kills," but actually do kill and maim hundreds of people each year, especially children, as one cannot cross a busy street without endangering its life. In the interests of horses and horse-breeders, it is only fair to ask that the number of fatal and serious accidents caused by motors and such-like vehicles should be published at regular intervals, together with those caused by horses, so that the comparison as regards the destruction of human life could be easily seen.

Not that people who have grown accustomed to go to business or to pleasure at such a tremendous pace would turn once more to the comparatively leisurely-going horse-drawn vehicle, although they would be far less likely to suffer from nervous breakdowns if they did; but the daily papers have a tendency to put the all-conquering power of the motor in a prominent position, and say little or nothing about what may well be called the all-killing power of the same. But this journal is devoted to the interests of high-class live stock, including horses; hence the need to champion their cause.

Those who use main roads for horses cannot move a yard without being forcibly reminded that, although made for horse-drawn vehicles to travel on, they have been converted into asphalt or tarred tracks on which one cannot ride or drive a horse with pleasure or safety owing to their glass-like surface, and this doubtless helps to cause many who would be horse-users to give them up.

So far it is only in the street and on the road that the horse's rival holds sway. The nation needs horses to mount its soldiers. The hunting man must have them to follow hounds, and such sport is as popular as it ever was. Finally, the farmer cannot plant or secure his crops without horses. In fact, agriculture has never been so dependent on horse-drawn machinery as it is to-day, so that there are fields where the horse holds its own, and as a showyard attraction he reigns supreme.

# Poultry.

## REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, SEPTEMBER, 1914.

Five thousand nine hundred and sixty-one eggs were laid during the month, an average of 149 per pen. R. Burns' Black Orpingtons (No. 1), T. Fannings's Black Orpingtons, and Cowan Bros.' White Leghorns tie for the monthly prize with 163 eggs each. The following are the individual records:—

| Competitors. | Breed. | Sept. | Total. |
|---|---|---|---|
| T. Fanning ... | White Leghorns | 144 | 754 |
| A. T. Coomber | Do. | 162 | 733 |
| Kelvin Poultry Farm | Do. | 128 | 711 |
| Moritz Bros., S.A. | Do. | 157 | 677 |
| Loloma Poultry Farm, N.S.W. ... | Do. | 154 | 669 |
| Loloma Poultry Farm, N.S.W. ... | Rhode Island Reds | 153 | 664 |
| R. Burns | Black Orpingtons (No. 1) | 163 | 655 |
| Geo. Tomlinson | White Leghorns | 158 | 640 |
| J. T. Coates | Black Orpingtons | 149 | 633 |
| Cowan Bros., N.S.W. | Do. | 163 | 629 |
| R. Burns ... | S. L. Wyandottes | 153 | 615 |
| J. R. Wilson | White Leghorns | 141 | 613 |
| E. Le Breton | Do. | 159 | 604 |
| A. F. Camkin, N.S.W. | Do. | 156 | 598 |
| R. Burns ... | Black Orpingtons | 158 | 596 |
| Mrs. Bieber | Brown Leghorns | 151 | 590 |
| A. H. Padman, S.A. | White Leghorns | 159 | 584 |
| J. Gosley .. | Do. | 146 | 584 |
| R. Jobling ... | Do. | 139 | 580 |
| T. Fanning ... | Black Orpingtons | 163 | 577 |
| E. V. Bennett, S.A. | White Leghorns | 151 | 573 |
| Geo. Austin | Do. | 133 | 573 |
| J. Franklin | Do. | 150 | 572 |
| Mrs. Munro | Do. | 152 | 568 |
| J. T. Coates | Do. | 156 | 567 |
| J. D. Nicholson, N.S.W. .. | Do. | 132 | 564 |
| Marville Poultry Farm, Victoria | Do. | 156 | 563 |
| J. Manson ... | Do. (No. 1) | 144 | 558 |
| Derrylin Poultry Farm ... | Do. | 153 | 555 |
| F. McCauley | Do. | 153 | 553 |
| J. Kilroe ... | Do. (No. 1) | 131 | 536 |
| J. Kilroe ... | Do. (No. 2) | 144 | 536 |
| Douglas Moreton, N.S.W. | Do. | 141 | 529 |
| Range Poultry Farm | Do. | 147 | 522 |
| Mrs. Bradburne, N.S.W. | Do. | 148 | 520 |
| J. Zahl | Do. | 138 | 511 |
| J. N. Waugh, N.S.W. | Do. | 130 | 495 |
| C. M. Jones | Do. | 151 | 493 |
| J. M. Manson | Do. (No. 2) | 149 | 467 |
| J. Murchie ... | Brown Leghorns | 146 | 464 |
| Total | ... | 5,961 | 23,425 |

## THE ROOSTER AS AN ENEMY.

The rooster (says the "Nor'-West Farmer") is one of the worst enemies the farmer can have about the flock during the heated days of midsummer. This has been abundantly proven during the past eight weeks in this country. Every dealer in the egg business could tell of hundreds of dozens of rotting eggs coming out of cases that were marketed within a few days of the time they were laid. Thousands of city housewives could tell of eggs that seemed to deteriorate very rapidly during the hot weather of July.

In most of these cases the rooster in the flock has been the cause of the loss. The egg is fertilised, and the heat has been sufficient to start incubation. Then the egg is spoiled, and it rapidly develops its claim to be classed as a common "rot." Infertile eggs are very little affected by the heat. Of course, a reasonable degree of warmth is conducive to the spread of moulds, &c., but if protected from these, an infertile egg, though its contents will shrink somewhat from evaporation, will stand any reasonable degree of summer temperature without other injury.

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## FATTENING FOWLS.

The question of fattening fowls is a most important branch of commercial poultry keeping, yet, if one may judge by the condition of the poultry sent in for sale to the Brisbane and other markets of this State, it is a branch of the business which is more honoured in the breach than in the observance of it. As a general rule farm-bred fowls would be expected to be plump and fleshy, but the reverse is usually the case. The fowls have the run of the place, and pick up any amount of food of various kinds, particularly waste corn, either on the field or round the barn, but this is not the way to fatten fowls for the market. There are certain stock foods used by professional fowl fatteners in Europe which not only fatten the birds, but which also produce plenty of breast meat. Mr. E. Cobb, writing on this subject in "The Feathered World" some considerable time ago, described what a really good table fowl is, and pointed out the best means to be employed to produce such. In the first place, a fowl to be classed as "a prime" should have white skin, legs, and feet. The bird should be young, and if a cockerel his spurs should not have commenced to shoot, and he should weigh when first put into the fattening coop not less than 5 lb. The breast bone should be perfectly straight, and plenty of breast meat should be carried thereon.

There are a number of crosses which produce most excellent table birds—almost any cross with the Langshan will produce a bird of good quality—but there is no cross which, when viewed from every standpoint, will compare so favourably for this purpose as that between the Indian Game and the dark or coloured Dorking. The Indian Game carries more breast meat than any pure breed living, and the Dorking possesses the

longest keel, and has white legs and feet, so that a combination of these two breeds produces a bird with a superabundance of breast meat, and, at least in nine out of ten cases, fowls with white skin, legs, and feet.

Now, about the necessary food. In France the food chiefly used varies somewhat according to different districts, but the most general mixture is, one-half barley meal, one-quarter maize meal, and one-quarter buckwheat. Barley meal is far too heating to be given to fowls shut up in fattening coops. Maize meal undoubtedly fattens fowls, but all it produces is fat, and that of the very worst kind, being yellow fat. Ground oats should be the staple food.

As a rule fatters do not give the food otherwise than in a cold state. That is all very well in summer, but in cold weather the milk or water used should be warmed, thus making the food not hot, but nicely warmed, when taken by the birds, or when injected into the crop by the crammer.

The feeding times are at 6 a.m. in summer, and 7.30 a.m. in winter, then again at 5 p.m. in summer and 4 p.m. in winter, but young spring chickens require an extra feed at noon, and some large birds, quick at "emptying," may also with advantage be fed three times a day.

So much for the feeding of the birds to be fattened. We now come to the preparation of the fatted bird for market, supposing it to be killed and plucked.

Frequently—we might say, very generally—when poor birds are sent to the market the poulterer breaks the breast-bone, arguing, and truly so, that this process gives the bird the appearance of looking plumper than it really is, but that, as soon as the fowl is brought to the table and the knife is inserted into the breast, the deception is evident. Most purchasers of ready-dressed fowls in Brisbane and elsewhere have found that the plump-looking bird they purchased has proved to have practically no breast meat whatever. If you have a prime quality fowl with a good meaty breast, such as the game fowl usually carries, by all means leave it alone, because little or no improvement in its shape will be derived by breaking it down.

It is well known that some of the expert trussers in London poulterers' establishments will literally smash up a fowl before commencing to truss it, so that it lies almost as flat as the proverbial pancake, and then, by carefully inserting the fat under the skin, which had been taken from the gizzards, &c., of other well-fatted fowls, build it up to perfection.

With reference to the fattening coop: It is repeatedly recommended that coops consisting of small compartments, just sufficient to contain a fowl, and covered all over, with the exception of a small opening to enable the bird to put its head out and feed, and the bars at the bottom to allow of the manure passing into a tray beneath. Does it not stand to reason that if you pick a bird up off a farmyard or from anywhere

else where it has had its liberty, and confine the poor brute in a darksome cell, and in solitary confinement, that it will pine and fret, and, instead of putting on flesh, will weigh, at the end of three weeks or a month (those that survive), less than they actually scaled when first imprisoned?

The proper style of coop for the fattening of fowls is 8 ft. in length, 20 in. in breadth, 18 in. in height, divided into four compartments. The top is closed with 2½-in. battens, nailed 2 in. apart. The back is matchboarded. The front and divisions consist of iron bars ⅛ of an inch in thickness. Each compartment has a sliding door, and is capable of holding from six spring chickens to four large fowls, on an average about five. The bottom is nothing but narrow bars running from end to end, ¾ in. in thickness and bevelled off on the *upper* portion on each side to within ¼ of an inch. A trough is hung in front for the fowls to feed from.

The usual time occupied in fattening a fowl is about three weeks, but good-sized, well-conditioned pullets often taken only a fortnight, whereas very large-framed cockerels will take four, or even five, weeks before they are fully fatted.

## TIMES OF SUNRISE AND SUNSET AT BRISBANE—1914.

| Date. | September. | | October. | | November. | | December. | |
|---|---|---|---|---|---|---|---|---|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. |
| 1 | 6·3 | 5·33 | 5·29 | 5·47 | 4·58 | 6·5 | 4·46 | 6·28 |
| 2 | 6·2 | 5·34 | 5·28 | 5·48 | 4·58 | 6·6 | 4·46 | 6·28 |
| 3 | 6·1 | 5·34 | 5·27 | 5·48 | 4·57 | 6·7 | 4·46 | 6·29 |
| 4 | 6·0 | 5·35 | 5·26 | 5·49 | 4·56 | 6·7 | 4·46 | 6·30 |
| 5 | 5·59 | 5·35 | 5·25 | 5·49 | 4·56 | 6·8 | 4·46 | 6·31 |
| 6 | 5·58 | 5·36 | 5·24 | 5·50 | 4·55 | 6·9 | 4·46 | 6·31 |
| 7 | 5·57 | 5·36 | 5·23 | 5·50 | 4·54 | 6·9 | 4·46 | 6·32 |
| 8 | 5·56 | 5·37 | 5·21 | 5·50 | 4·54 | 6·10 | 4·46 | 6·33 |
| 9 | 5·54 | 5·37 | 5·20 | 5·51 | 4·53 | 6·11 | 4·46 | 6·33 |
| 10 | 5·53 | 5·37 | 5·19 | 5·52 | 4·52 | 6·11 | 4·47 | 6·34 |
| 11 | 5·52 | 5·38 | 5·18 | 5·52 | 4·52 | 6·12 | 4·47 | 6·35 |
| 12 | 5·51 | 5·38 | 5·17 | 5·53 | 4·51 | 6·13 | 4·47 | 6·36 |
| 13 | 5·50 | 5·39 | 5·16 | 5·53 | 4·51 | 6·14 | 4·47 | 6·36 |
| 14 | 5·49 | 5·39 | 5·15 | 5·54 | 4·50 | 6·14 | 4·48 | 6·37 |
| 15 | 5·48 | 5·40 | 5·14 | 5·54 | 4·50 | 6·15 | 4·48 | 6·37 |
| 16 | 5·46 | 5·40 | 5·13 | 5·55 | 4·49 | 6·16 | 4·48 | 6·38 |
| 17 | 5·45 | 5·41 | 5·12 | 5·56 | 4·49 | 6·17 | 4·48 | 6·39 |
| 18 | 5·44 | 5·42 | 5·11 | 5·56 | 4·49 | 6·18 | 4·49 | 6·39 |
| 19 | 5·43 | 5·42 | 5·10 | 5·57 | 4·48 | 6·18 | 4·49 | 6·40 |
| 20 | 5·42 | 5·42 | 5·9 | 5·57 | 4·48 | 6·19 | 4·50 | 6·40 |
| 21 | 5·41 | 5·42 | 5·8 | 5·58 | 4·47 | 6·20 | 4·50 | 6·41 |
| 22 | 5·40 | 5·43 | 5·7 | 5·58 | 4·47 | 6·21 | 4·51 | 6·42 |
| 23 | 5·38 | 5·43 | 5·6 | 5·59 | 4·47 | 6·22 | 4·51 | 6·42 |
| 24 | 5·37 | 5·44 | 5·5 | 6·0 | 4·47 | 6·22 | 4·52 | 6·43 |
| 25 | 5·36 | 5·44 | 5·4 | 6·0 | 4·47 | 6·23 | 4·52 | 6·43 |
| 26 | 5·35 | 5·45 | 5·4 | 6·1 | 4·46 | 6·24 | 4·53 | 6·43 |
| 27 | 5·34 | 5·45 | 5·3 | 6·2 | 4·46 | 6·25 | 4·53 | 6·44 |
| 28 | 5·33 | 5·46 | 5·2 | 6·2 | 4·46 | 6·25 | 4·54 | 6·44 |
| 29 | 5·32 | 5·46 | 5·1 | 6·3 | 4·46 | 6·26 | 4·54 | 6·44 |
| 30 | 5·30 | 5·47 | 5·0 | 6·4 | 4·46 | 6·27 | 4·55 | 6·45 |
| 31 | ... | .... | 4·59 | 6 5 | ... | ... | 4·56 | 6·45 |

### Phases of the Moon.

| | | | H. | M. | |
|---|---|---|---|---|---|
| 5 Sept. | ○ | Full Moon | 12 | 1 | a.m. |
| 13 „ | ☽ | Last Quarter | 3 | 48 | „ |
| 20 „ | ● | New Moon | 7 | 33 | „ |
| 26 „ | ☾ | First Quarter | 10 | 3 | p.m. |
| 4 Oct. | ○ | Full Moon | 3 | 59 | p.m. |
| 12 „ | ☽ | Last Quarter | 7 | 33 | „ |
| 19 „ | ● | New Moon | 4 | 33 | „ |
| 26 „ | ☾ | First Quarter | 8 | 44 | a.m. |
| 3 Nov. | ○ | Full Moon | 9 | 49 | a.m. |
| 11 „ | ☽ | Last Quarter | 9 | 37 | „ |
| 18 „ | ● | New Moon | 2 | 2 | „ |
| 24 „ | ☾ | First Quarter | 11 | 39 | p.m. |
| 3 Dec. | ○ | Full Moon | 4 | 21 | a.m. |
| 10 „ | ☽ | Last Quarter | 9 | 32 | p.m. |
| 17 „ | ● | New Moon | 12 | 35 | „ |
| 24 „ | ☾ | First Quarter | 6 | 25 | „ |

# State Farms.

## ROMA.

Report for September:—

*Meteorological.*—The dry conditions of August were partially relieved during the second week of the month, when 58 points of rain were recorded. Since then warm days and strong winds have been experienced, consequently at time of writing the outlook is similar to what it was at time of forwarding previous month's reports.

The maximum temperature recorded was 86·5 deg., average 78·0 deg. Minimum temperature was 38·0 deg., average 49·0 deg. Rainfall, 58 points, representing three falls.

*Winter Cereals.*—The early sown early watering varieties should be fit to harvest within the next ten days. Some of these crops should yield at least 7 bags to the acre unless the grain is very much pinched. The effect of the rain upon the early-sown new-season maturing varieties was most marked, and they will without any more give a light yield. Should rain fall within the next few days they will improve wonderfully. Some of the new crossbreds give promise in some essential features of being better than any varieties at present being grown here, which is very gratifying.

*Vineyard.*—The vines are making wonderful growth, and most varieties give prospects of good yields.

*Orchard.*—Most of the trees have blossomed freely. Rain is needed to ensure the setting of the crop. More especially does this apply to the citrus fruits.

*Summer Crops.*—The lack of sufficient moisture to ensure germination, or to give the land where required the final preparation, has greatly retarded the sowing of these crops. The following have been put in to date, viz.:—Peanuts, 1/7 acre, above ground; melons, 1/16 acre, partial germination; seff grass, 9/10 acre, sown dry soil; kaffir corn, 6·5 acre, sown dry soil; feterita, ½ acre, sown dry soil. When sufficient rain is experienced to enable the land to be reduced to the desired tilth a further 9 acres will be devoted to the growth of white kaffir, sorghum, &c.

*Hay.*—Owing to the wheat on the areas sown originally for hay purposes having given promise of yielding good crops of grain, it has been permitted to stand for that purpose, and only those of poor prospects have been converted into hay. So far, 6 acres have been cut for this purpose, and the material will be ready to draw in by the beginning of next week. As there is not any prospect of utilising more of the winter cereal crops for this purpose, sowings of summer crops will have to be made.

*Visitors.*—These have been more numerous of late.

*Stock.*—Cattle and horses look exceedingly well considering all things.

*Buildings, &c.*—The balance of the round timber for the stables has been obtained, also sufficient to put up a yard and a crush.

All work such as watering trees, chaffcutting, hoeing, harrowing, cultivation, &c., has been carried out as required.

# Tropical Industries.

## SUGAR-CANE CULTIVATION IN THE PHILIPPINES.

While sugar-cane is not a plant which requires an extremely fertile soil in order to yield good returns, nevertheless it should be understood that the higher the state of fertility the greater the yield that may be expected.

Doctor Stubbs found that each ton of Louisiana purple cane removes from the soil 0·8 lb. (0·361 kilo) of lime, 2·17 lb. (0·985 kilo) of potash, 1·48 lb. (0·674 kilo) of phosphoric acid, and 1·5 lb. (0·68 kilo) of nitrogen.

A good soil should produce 75 tons of cane per hectare (2½ acres) under proper conditions, and this often is very much exceeded. With the removal of such a crop of cane there will be taken from the soil 28·5 kilos of lime, 73 kilos of potash, 47·5 kilos of phosphoric acid, and 51 kilos of nitrogen. (1 kilo = 2·204 lb.) If none of this material is again returned to the soil, and no attempt made to restore the necessary plant-food elements thus extracted, the soil is forced to diminish year by year in fertility, until eventually a state will be reached when it will no longer produce a profitable crop.

The ashes from the bagasse are usually applied to the roads or used to fill up depressions about the factory. This may be combined with the filter-press refuse, and thus a complete fertiliser made for cane which may be applied with benefit on practically all cane soils.

The juice from the sugar-cane contains little or no mineral matter, consequently, practically all that was originally in the cane will be recovered from the ash of the bagasse; this, judiciously applied to the land where the cane was removed each year, will form the only fertiliser that is needed, excepting the nitrogen, which was mostly lost in burning the bagasse. The cane lands of these Islands have been cropped for many years, and consequently most of them are becoming depleted in the mineral elements required by the cane, since no attempt has been made to restore them even in the application of the bagasse ashes.

Since the climatic conditions in these Islands are such that often a great deal of water falls in a few months during the rainy season, soluble plant-food elements at this time are liable to become badly leached and thus lost to the plant. This is especially the case where soluble commercial fertilisers are applied. Another point is that the young growing plant needs these elements the most during the early stages of growth. It is therefore an excellent scheme to apply the fertilisers in two or three applications. The first, consisting of about one-third of the total amount to be applied, should be scattered in the rows immediately after the irrigation water has passed through and just before the planting is to be done. This will have the effect of locating

itself in the very region where the growing plant, and particularly the young plant, needs it most. In this case it is leached downward and thus induces the roots to take that same course, which brings them in contact with a supply of plant food as well as a ready supply of moisture.

Another reason why this subsoil here is often found to be quite deficient in these elements is in the fact that only very extremely shallow ploughing has been practised, so that no opportunity has been offered the cane to draw its necessary subsistence from the underlying ground or subsoil.

*Preparation of the land.*—This is one of the most important parts of the work and one that is greatly neglected in these Islands.

In the first place, the land should be thoroughly and carefully ploughed. There is no danger in ploughing deep for sugar-cane, but, on the contrary, much to be gained. The roots of this plant will penetrate to a great distance if the subsoil is properly broken so that they will be within reach of a constant supply of moisture. It is asserted by some that the crop immediately following the first deep ploughing is likely to be somewhat lighter than usual. This assertion may be well founded since a quantity of the undersoil is being stirred up which is likely to be deficient in nitrogen on account of there being little or no humus mixed with it the first year or so. In order to establish a system of permanent agriculture, however, it is imperative that the soil be ploughed to a sufficient depth. The ploughing of the tough cogon lands is somewhat difficult with the ordinary plough, and a special apparatus for this work was devised by the Bureau of Agriculture to meet the conditions in these Islands.

The lands should next be cross-ploughed either with disc or mould-board plough, and then worked to a fine physical condition by the use of discs, harrows, rollers, &c. Too little attention is ordinarily paid to the packing of the soil after it has been thoroughly worked into a fine mechanical condition. One purpose of thoroughly stirring the ground to a good depth is to properly ærate it, since both sunlight and air are essential to bacterial development in the soil. Certain nitrogen-bearing fertilisers are made available to the plant by this bacterial action. Stirring also loosens up the soil so that the rootlets may penetrate it and aid capillarity so that the water will be brought nearer the surface. The packing of the land with a heavy roller as well as the formation of a mulch of fine dirt over the top has the effect of preventing this moisture from escaping by evaporation. The light soils which suffer badly during the dry season in particular should be treated in this manner. By this means many of the districts which have hitherto produced little in growth during the dry season may be made not only to remain green, but also to grow a great deal as well.

Just before the land is to be planted it should be furrowed out in rows 1½ metres apart. This furrowing may best be done with a form of the large single-shovel plough which throws the dirt up on both sides. Hoes may be used to clean out the furrow thus formed, but they should never be used solely for the work of furrowing out since this

requires an excessive amount of labour and is altogether unsatisfactory. These furrows should be made from 20 to 30 centimetres deep, depending upon the condition of the soil and the subsequent method proposed.

*Seed and its preparation.*—Only the immature cuttings should be used for planting, since upon reaching maturity the cane becomes woody and loses its ability to send forth new shoots. Where cane is left until full maturity is reached, as in the case of milling, only the topmost joints which are green and contain good eyes should be used. Where it is desired to plant a large area, however, and where there is indication of a limited supply of points during milling time, the cane may be cut early and the whole stalk used for planting.

It is imperative that points should be selected from the best varieties grown in fields free from insect pests and from those which have proved a success in that locality. The points should be cut of such a length that they will each contain two or three good eyes. They should then be placed in piles or tied in bundles and protected from the sun and dry air which would cause them to dry out too much. Likewise, they should be kept from excessive moisture until their final preparation for planting, which will consist of soaking them in clear running water from twenty-four to forty-eight hours before planting. The length of time that they should be soaked will depend upon the kind of points, condition, &c. In no instance should they be allowed to remain in the water until deterioration begins.

*Irrigation.*—If water is available for irrigation it is well to make the first application a short time before the cane is to be planted. This may be done by allowing the water to move slowly down the furrows in order to give it an opportunity to be taken up by the surrounding soil and thus form a ready supply of moisture for the cane. Subsequent applications of water may be made in the cane rows over the cane until they are thoroughly filled up and then through a furrow along near the cane rows. There is nothing that pays better than the irrigation of sugar-cane during the dry season, and yet this so important a point is grossly neglected practically everywhere in the Philippine Islands. Even where but a limited supply of water is available, as from the small artesian wells, it should be applied on the area it is capable of watering. In many places there are rivers which may be dammed up, causing the water to rise so that but a very small lift would be required to bring it to the cane fields.

Although sugar-cane requires a great deal of water for successful growth, yet it must not be permitted to remain over the cane for any length of time, nor should the land be so saturated that the roots will be in contact with stagnant water, for such a condition will cause them to rapidly die off.

*Planting.*—In planting the cane it may either be placed flat in the row or inclined at an angle of about 45 degrees; the latter is to be preferred where the ground is not too dry. The points should be placed from 4 (1⅝ in.) to 20 (8 in.) centimeters apart in the row, depending

upon their condition, vitality, &c. It must be borne in mind that cane can ripen well only where it has full space for expansion, and also that cane planted moderately thin will stool better than that planted thick in the row. It should then be covered with 4 or 5 centimeters of fine earth, and at each cultivation more earth thrown on until the rows are level with the rest of the ground—or they may be even hilled up during the latter part of the cultivating season. This has the effect of stimulating root, growth which will greatly aid in supporting the cane during wind storms. It also induces the growth of new shoots, thus increasing the yield of cane per hectare. Any points which have not germinated should be replanted as soon as possible after they are detected, and this work of replanting should be continued as long as there are any blank spaces.

*Cultivation of the Cane.*—Nothing is more harmful to growing cane than a hard crust on the top of the ground caused by the action of the sun upon soil that has become run together after rains or irrigation. This has the effect of preventing the proper aeration of the soil which is so essential to bacterial growth.

Careful and thorough cultivation must be practised during the growing season after the ground becomes sufficiently dry, and this should be done fairly deep in order to loosen the soil so that the new roots can better penetrate it.

Weeds and grass, which are so inimical to plant growth, will also be destroyed by proper cultivation.

—"Philippine Agricultural Review."

## TOBACCO.

The aim of the tobacco-grower is to obtain a fragrant leaf with good burning qualities. Heavy loam, clay, or peat soils will not do this. The plant being of tropical origin, a warm soil is essential, and one with but moderate quantities of organic matter produces the leaf of finest texture. Rank organic manures must be avoided, as well as all materials containing chlorine. The fine gold leaf tobacco of North Carolina is grown upon a light gravelly soil. A red clay sometimes produces a fine, rich, mahogany-coloured leaf of high value. Limestone soils, too, will yield high-grade tobacco. Potash is of the utmost importance to this crop, which consumes large quantities of it, but in order to obtain a leaf that will burn well, all the forms of potash salts containing chlorine, such as kainit or muriate, must be avoided. Stable manure is preferably applied to the crop preceding tobacco. The 600 lb. per acre of a fertiliser containing available phosphoric acid, 7 per cent., potash, 10 per cent., nitrogen, 3½ per cent. Nitrogen in the form of dried blood gives profitable results.

## SHORT DIRECTIONS FOR PLANTING SISAL HEMP AND EXTRACTING THE FIBRE.

1. Lay out the ground with a 12-ft. roadway between every 8 rows.
2. Put in the plants in holes 8 ft. apart every way.
3. Plant them perfectly upright.

4. There is no need to plough up the whole ground. When any tall grass or bushes grow between the rows, cut them down every three or four months. The plants must have no shade.

5. Plants produce better fibre in unploughed than in ploughed ground.

6. Take off any dead leaves from the plants before putting in. Treat them like pineapple plants, and cut off all old roots; by so doing the plants quickly send out new roots, and start growing at once.

7. When planting, allow no soil to fall between the leaves, or the plant will rot.

8. In very dry weather give each plant, when planting out, a pint of water. They will take root in a week, and after that will defy dry weather.

9. Suckers and bulbils may be put out in a nursery until they are about 8 in. high, when they are at their best for planting out.

10. Do not plant in low or wet ground. Dry ridges suit the plants best.

11. When plants are three years old, a first crop of 8 or 10 leaves per plant may be cut. In four years a full crop of 20 leaves may be cut, but this only refers to tropical Queensland. In the South a first crop cannot be obtained under from four to five years.

12. The yield of fibre is 4 per cent. of the weight of leaf. A 4-lb. leaf will give 1½ to 1¾ oz. fibre.

13. If the leaves are regularly cut, the plants will not send up a pole for from ten to fifteen years. When a plant poles, the 200 leaves still left will be lost. But if the pole, at its first appearance, is cut, the plant will live twelve months longer, and all the leaves will be saved.

14. Cut away all suckers, and, if no ground is ready for them, put them in a nursery for future planting.

15. Leaves are ready for cutting when they droop from a perpendicular to a horizontal position.

16. There is no regular season for planting or harvesting. Both operations may be carried out at any time of the year, but September is the best month for planting.

17. A machine for scutching costs about £35 to £40 in Brisbane. Hand machines are unworkable, as a high speed (400 revolutions a minute) is required. Use a horse gear or oil engine.

18. With a good machine (the Lehmann, Death and Ellwood, Todd, Prieto, or Finnigan-Zabriskie) from 8,000 to 150,000 green leaves can be passed through the drum in ten hours. These machines are, however, expensive, costing from £400 to £500.

19. About 100 gallons of water are used daily to wash the fibre as it passes through the smaller machines, and about 1,000 gallons with the largest. When the fibre comes out, it is hung upon wire lines in the sun for a few hours, and after a day or two in the shed it is then ready for baling and sending to market.

20. The cost of production is about 1d. per lb. of fibre. Generally speaking, the whole cost, from cutting to market, is about 40 per cent.

of the value of the fibre—that is to say, if you sell fibre at the usual market value—£35 per ton—the cost of production will be £14, and the balance profit.*

21. The average annual return of fibre is about 10 cwt. per acre for the first year or two, and after that as much as 1 ton. In Yucatan 1½ ton of fibre was produced from two-year-old plants, but this was exceptional, and cannot at all be reckoned on, although at St. Helena Penal Settlement 2½ tons were obtained from an acre, and at Childers a crop averaged 1½ tons.

22. Melbourne will take 2,000 tons of fibre per annum, and there is a never-failing market in Sydney, New York, as well as (before the war) in Germany, France, Ireland, Scotland, and England.

## POISONING FLOWERING FOREST TREES AND SPRAYING FRUIT TREES WHEN IN BLOSSOM.

Mr. A. N. J. Hill, Toorbul, has written on the subject of poisoning flowering forest trees, as well as spraying fruit trees, when in blossom. He argues that if the poisoning of forest trees were done when the trees are in flower, the poison would flow with the sap (as intended to ensure destruction of the tree) and would also reach the flowers, thereby poisoning the honey, and hence not only killing the bees, but rendering the honey dangerous to human beings. We have not yet heard of an instance in which the honey has been injuriously affected, but there seems to be good foundation for his suggestion that apiaries may be destroyed by the nectaries of the blossoms of trees being affected, and he reasonably argues that the destruction of forest trees might be undertaken at some time of the year when the trees are not in blossom.

This matter was submitted to Mr. G. Butler, secretary of the Queensland Beekeepers' Association, and his opinion was given as follows:—

"Although I am not acquainted with the methods adopted for the destruction of trees by the use of arsenic, there is some argument in Mr. Hill's contention that its use is a menace and danger to human beings. If the poison were used in close proximity to an apiary there would be a probability of its ultimate extinction from its effects. The spraying of fruit trees when in bloom is also detrimental to the beekeeper, and in America the effect was felt so severely that legislative action had to be taken to protect the interests of the apiarists. I understand that the trees are now sprayed after the fruit has set. Arsenic, being of a sweet nature, would readily attract bees, and being swift on the wing there is every probability that they would arrive safely home before any ill effects were experienced by them."

* It should be understood that the price of sisal fibre fluctuates in response to the price of Manila hemp. For instance, in 1907, Queensland sisal fibre sold at £36 10s. f.o.b. Brisbane. In 1908, the price fell to £24 per ton in August, corresponding to a fall in the price of Manila, whilst in February it realised £30 per ton net.

# Forestry.

## A POSSIBLE NEW INDUSTRY.

Notwithstanding the fact of there being still some 600,000,000 ft., or more, of timber available in Queensland, the drain upon the timber resources is ever increasing, and many schemes have been proposed for utilising the vast amount of valuable material represented by the heads of pine and other trees left to rot in the scrubs and forests of the State by timber-getters who only carry away the marketable logs, leaving the heads, consisting in many cases of heavy limbs, to go to waste. This abandoned raffle of timber has all got a money value, and that value might be obtained by converting the waste into wood pulp. The United States and Canada are fully alive to this, and so is Germany. The uses of this pulp are numberless, particularly for paper-making. One of the chief New York papers announced that it uses, in its morning and evening editions, some 11 acres of woodland, producing about 7,000 ft. per acre. Something like 280,000 ft. of timber are used for the supply of reading matter to New York by this one paper alone. Germany being now out of the running, an opportunity offers to establish this industry on a large scale in Queensland.

There is, however, another industry which might with advantage be taken up, and that is the utilisation of straw for the manufacture of artificial timber. An English journal, in 1909, stated that over 50,000 boxes of butter arrived in England from Queensland (in 1913-14, 500,000 boxes were graded in Queensland), and described a butter-box, said to have been manufactured in Queensland from barley straw, and pointed out that the 3.000,000 boxes used in Australia annually cost £200,000. The straw boxes would save the dairying industry £40,000 a year. The material for manufacturing the box could be grown in the same paddock that supports the cow. This box was said to weigh 10½ lb., to be damp-proof and odourless. Certainly we never heard of such boxes having been manufactured or used in Queensland. Some were made in Victoria, by intermixing straw with kaolin, but on trial being made to ascertain if they would bear the strain of a load of a layer of twenty boxes, it was found that they collapsed under a load of eleven boxes.

The above remarks lead us to a consideration of the manufacture of

### FRENCH ARTIFICIAL WOOD,

described in "The Journal of the Royal Society of Arts," as follows:—

"Some attention has lately been directed in Lyons to an artificial wood which, it is stated, will be of great value as a substitute for natural wood. The process consists in transforming straw into a solid material having the resistance of oak. The straw, after being cut into small pieces, is reduced by boiling to a paste, to which certain chemicals are added. When the paste has been reduced to a homogeneous mass it is put into presses, and planks, beams, laths, and mouldings of all sizes are readily made. This new material can be sawn like natural wood. As a fuel, it emits a bright flame and little smoke. It is further stated to be adaptable to the manufacture of match stems. Many are the uses this article could be put to, notwithstanding the fact that we have plenty of wood in the State, besides that which is stated in the article, and so perhaps open up new industries in its application."

# General Notes.

## SOW EATING HER PIGS.

It is said that a very effective remedy or preventive is to feed salt-soaked pork to a sow that is commencing to eat her pigs. Any little pigs that are accidentally killed should be chopped up in small pieces and put down in salt brine. These, fed to the sow, will be devoured ravenously, and probably induce vomiting, but it is said that it is a perfect cure. Other remedies are rubbing kerosene, bitter aloes in water, or assafœtida in a glue solution, over the little pigs.

## PROLIFIC ORANGE TREES.

At Magaliesberg, South Africa, some wonderful returns have been obtained from orange trees. It is recorded by a grower in " S. African Gardening and Agriculture " (Aug., 1914) that from three seedling orange trees, estimated to be over 50 years old, he has taken 11,030 fruits this season, some of which were 3½ in. in diameter, and expects to get another two or three thousand yet. The trees, which are planted on the side of a dam, are 35 ft. high, and the same in diameter.

Magaliesberg is a district in the Witwaters Rand, north-west of Johannesberg, in the same latitude as Maryborough and Gympie districts, where oranges thrive as well as in any part of Queensland. The 14,000 fruits from these trees represent 1,554 bushel cases, or 518 cases per tree, which at lowest Queensland market prices, say, 4s. per case, would be worth £103 per tree.

## NATIVE BIRDS PROTECTION ACTS.

### DESTRUCTION OF NATIVE BIRDS.

Notwithstanding the many insect pests which damage or destroy crops of all descriptions, it seems impossible to impress upon the holiday-maker's mind that, were it not for insectivorous birds, these pests would increase to such an extent as to make the raising of field crops, vegetables, and fruit too expensive a business to be profitable. Even a gun tax, to include the mischievous pea-rifle, would be powerless to protect the birds, in consequence of the practical impossibility of enforcing it in country districts. Whilst the legitimate sportsman carefully observes the close season for game birds, the boy with the pea-rifle is troubled with no conscientious scruples on that score. He looks upon every member of the feathered tribe which comes within reach of his weapon as the legitimate object of his nefarious sport. If the attention of these shooters were directed only towards the fruit or leaf eating birds, no objection could be raised towards their sacrificing thousands of them. Unfortunately, they cannot discriminate between

useful and destructive birds; and who is there to teach them? If every State and private school were supplied with well-executed coloured plates of both classes, the teachers would be able to do a great deal towards minimising the evil. We proposed at one time to issue with every Journal one or two such coloured plates, but, unfortunately, these are expensive, and the times have of late been too bad to enable us to carry out the idea. But we shall by no means lose sight of it. Take a few of our insectivorous birds, such as crows, ibis, curlews, owls, night-jars (otherwise moreporks), &c. The crow is generally cunning enough to distinguish between a stick and a gun, and less frequently falls a victim to the gunner. Crows, although they are notorious for destroying chickens, young birds, hares, &c., yet render signal service to the farmer by destroying mice, cutworms, wireworms, &c. It has been calculated in Germany by Herr Rörig that "a field mouse and its progeny will destroy 1,000 plants of grain whilst the latter are developing." We know what tremendous losses the plague of mice inflicted on farmers last year. He also stated that "About 3,000 crows, by destroying mice and other vermin, benefit farmers to the amount of £2,500 per annum. In other words, what is commonly but erroneously known as the carrion crow benefits him to the amount of 11d. per bird per annum over and above the loss it causes him by the destruction of chickens, eggs," &c. Anyone who has watched the flocks of ibis on newly-ploughed land, thrusting their long curved bills deep into the soil, and devouring thousands of worms, grubs, beetles, and larvæ, must be impressed with the great value of these birds; yet how often are they shot in mere wantonness and left to rot on the ground? The number of mice consumed by owls is something incredible.

In 1905 we were indebted to Mr. Hy. Tryon, Government Entomologist and Vegetable Pathologist, for the following information on the food of various birds. He has closely studied their habits and examined their stomachs. This scientific phase of the question we do not attempt to deal with; the object of this article is to draw attention to the indiscriminate shooting of birds, destructive or useful, for no other purpose but sport, or "to keep one's hand in," as swallow and marten shooters express it:—

## INSECTIVOROUS AND PARTLY INSECTIVOROUS BIRDS.

*Ibis.*—The food of the birds comprised by this name consists of frogs, especially in the tadpole state, grasshoppers, grass-eating caterpillars, ground-frequenting caterpillars, soil-frequenting "grubs" generally, young fish, &c.

*Carrion Crow.*—No bird in Australia bears this name that may be erroneously bestowed on the common crow or raven, or on the white-eyed crow, both of which possess feeding habits distinct from those of the European "carrion crow." The food of the bird of coastal Queensland, the former of the two kinds mentioned, includes grasshoppers, locusts, cicadas, moths, grass-eating caterpillars, soil-frequenting grubs, and large insects generally. Ticks, rats and mice, eggs of poultry and

wild birds, young chickens and ducks (exceptionally); seeds of cereals when broadcasted, plantlets of cereals, maize from the cob (exceptionally), lambs, the eyes of cast ewes and of bogged sheep and cattle; fruit, *e.g.*, pineapples and watermelons; carrion and offal generally.

*Pied Crow* (*Shrike*).—Insects of various kinds, especially the larger ones—*e.g.*, grasshoppers, locusts, &c.; seeds, berries of wild and cultivated trees, coffee berries, fruit generally—oranges, figs, grapes, strawberries, to most kinds of which it is highly destructive; carrion, including dead birds, &c.

*Morepork* (Ninix).—The smaller kinds feed on various nocturnal insects, on rodents, on small birds, on young domesticated pigeons. The largest kinds the same, and on birds as large as a laughing jackass—*Decelo sp.* (Brennan).

*Night-jar.*—On various nocturnal flying insects, and especially on moths.

*Laughing Jackass.*—On large insects, grasshoppers, locusts, &c., lizards, iguanas (small), snakes, small rodents (rats and mice), chickens, young birds.

*Kingfishers* (1. *Halcyon*).—Feed on grasshoppers, mantidæ, noctuid caterpillars, lizards (small), tree frogs, spiders, tipulid flies, beetles, white-ants.

*Kingfishers* (2. *Alcyone*).—Small fish, aquatic insects, flying insects hovering over water.

*Butcher Birds* (*Cracticus spp.*).—Feed on large insects (grasshoppers, &c.), small lizards and other reptiles, small snakes, caterpillars, soil-frequenting "grubs," small rodents (mice, &c.), nestling birds, small birds both wild and domesticated, very young chickens, hive bees (exceptionally).

*Dollar Birds.*—Insects (especially beetles) occurring on the wing and in tree-tops; hive bees (exceptionally).

The whole of the State is now under the operation of the Acts, and Queensland is divided into two districts, for which two distinct close seasons are provided. New names have been included in the lists of protected birds. Schedule A contains the names of those totally protected, while in Schedule B will be found those to which partial protection only is afforded. Considering the valuable asset insectivorous birds are to the State, and especially to those people whose occupation is connected with the land, there should be ready assistance given to the Department in the protection of our native birds. It should be noted that any person can prosecute under the Acts.

Reserves can be proclaimed with the consent of the owner or occupier of private lands, and rangers (honorary) appointed when a reserve has been created.

The following particulars—showing the birds which are subject to the operation of the Native Birds Protection Acts, the periods of the year during which the Acts are in operation, and the reserves set apart for the preservation and protection of such birds—are published for general information:—

# BIRDS ABSOLUTELY PROTECTED THROUGHOUT QUEENSLAND.

## SCHEDULE A.

| Common Name. | Technical Designation. |
|---|---|
| Australian Bee-eaters ... ... ... ... | Merops |
| Babblers ... ... ... ... ... ... | Timeliidæ |
| Bell Birds ... ... ... ... ... ... | Oreoica |
| Bitterns ... ... ... ... ... ... | Ardeiformes |
| Black Cockatoos of all species ... ... | Calyptorhynchus |
| Black Swans ... ... ... ... ... | Anatidæ |
| Bower Birds of all species ... ... ... | Ptilonorhynchidæ |
| Bush Chats of all species ... ... ... | Ephthianurinæ |
| Cassowaries ... ... ... ... ... ... | Casuariidæ |
| Caterpillar-eaters .. ... ... ... ... | Campophagidæ |
| Coachwhip Birds ... ... ... ... ... | Timeliidæ |
| Coucals or Swamp Pheasants ... ... ... | Centropodinæ |
| Cuckoo Shrikes ... ... ... ... ... | Campophagidæ |
| Cuckoos of all species ... ... ... ... | Cuculidæ |
| Diamond Birds (Pardalotes) ... ... ... | Dicæidæ |
| Dollar Birds (Rollers) ... ... ... ... | Eurystomus |
| Egrets of all species ... ... ... ... | Ardeiformes |
| Fantails ... ... ... ... ... ... | Muscicapidæ |
| Field Wrens ... ... ... ... ... ... | Timeliidæ |
| Flower-peckers ... .. ... ... ... | Dicæidæ |
| Fly-catchers (Wagtails) ... ... ... ... | Muscicapidæ |
| Fly-eaters ... ... ... ... ... ... | Muscicapidæ |
| Frogmouths ... ... ... ... ... ... | Podargidæ |
| Grebes ... ... ... ... ... ... | Podicipediæ |
| Herons ... ... ... ... ... ... | Ardeiformes |
| Honey-eaters (except Miners, Wattle Birds, Friar Birds) | Meliphagidæ |
| Ibises ... ... ... ... ... ... | Ardeiformes |
| Jabirus ... ... ... ... ... ... | Ardeiformes |
| Kingfishers (all species) ... ... ... ... | Alcedinidæ |
| Kites ... ... ... .. ... ... | Elanus |
| Land Curlews or Stone Plovers ... ... | Œdicnemidæ |
| Larks of all species ... ... ... ... | Motacillidæ, Alaudidæ |
| Laughing Jackasses ... ... ... ... | Alcedinidæ |
| Lyre Birds ... ... ... ... ... ... | Menuridæ |
| Magpies ... ... ... ... ... ... | Gymnorhina |
| Magpie Larks ... ... ... ... ... | Grallina |
| Martins ... ... ... ... ... ... | Hirundinidæ |
| Nightjars or Goat-suckers ... ... ... | Caprimulgidæ |
| Nuthatches or Tree-runners (Woodpeckers) | Sittidæ |
| Owls ... ... ... ... ... ... ... | Strigidæ |
| Parras ... ... ... ... ... ... | Parridæ, Glareolidæ |
| Parrots (Ground or Swamp) ... ... ... | Pezoporus |
| Pipits ... ... ... ... ... ... ... | Motacillidæ, Alaudidæ |
| Pittas of all species ... ... ... ... | Pittidæ |
| Pratincoles ... ... ... ... ... ... | Parridæ, Glareolidæ |
| Regent Birds ... ... ... ... ... | Genus Sericulus (Ptilonorhynchidæ) |
| Rifle Birds ... ... ... ... ... ... | Paradiseidæ |
| Robins of all Species ... ... ... ... | Muscicapidæ |
| Satin Birds ... ... ... ... ... ... | Genus Ptilonorhynchus (Ptilonorhynchidæ) |
| Shining Starlings (Calornis) ... ... ... | Eulabetidæ |
| Shrike Tits ... ... ... ... ... ... | Muscicapidæ |
| Song Larks ... ... ... ... ... ... | Timeliidæ |
| Spoonbills ... ... ... ... ... ... | Ardeiformes |
| Storks ... ... ... ... ... ... | Ardeiformes |
| Swallows ... ... ... ... ... ... | Hirundinidæ |
| Swamp Pheasants ... ... ... ... ... | Centropodinæ |
| Swifts ... ... ... ... ... ... | Cypselidæ |
| Thickheads (Whistlers) ... ... ... ... | Muscicapidæ |
| Thrushes of all species ... ... ... .. | Turdidæ, Prionopidæ |
| Tit Warblers (Tree Tits) ... ... ... ... | Sylviidæ |
| Tree-creepers ... ... ... ... ... | Climacteris |
| Tree-runners ... ... ... ... ... | Sittidæ |
| Warblers ... ... ... ... ... ... | Sylviidæ |
| White-eyes or Silver-eyes ... ... ... | Zosteropidæ |
| Wood Swallows ... ... ... ... ... | Artamidæ |
| Wren Warblers ... ... ... ... .. | Sylviidæ |
| Wrens of all species ... ... ... ... | Sylviidæ |

# BIRDS PARTIALLY PROTECTED THROUGHOUT QUEENSLAND.

## SCHEDULE B.

| Common Name. | Technical Designation. |
|---|---|
| Bronzewing Pigeons | Columbæ |
| Brown Hawks | Falconidæ |
| Bustards or Plain Turkeys | Otididæ |
| Coots | Rallidæ |
| Cranes | Gruidæ |
| Crakes | Rallidæ |
| Curlews | Charadriidæ |
| Dottrels | Charadriidæ |
| Doves | Columbæ |
| Ducks, Wild, of all species | Anatidæ (excepting Black Swans) |
| Emus | Dromæidæ |
| Fig Birds | Oriolidæ |
| Finches (including Plumhead, Banded, Painted, Zebra, and Redheaded Finches, &c.) | Ploceidæ |
| Geese, Wild | Anatidæ (excepting Black Swans) |
| Land Rails | Rallidæ |
| Mallee Fowls | Megapodiidæ |
| Moor Hens | Rallidæ |
| Native Companions | Gruidæ |
| Native Hens | Rallidæ |
| Orioles | Oriolidæ |
| Pigeons, all Wild | Columbæ |
| Plovers | Charadriidæ |
| Quails | Phasianidæ, Turnicidæ |
| Rails, Land and Water | Rallidæ |
| Scrub or Brush Turkeys | Megapodiidæ |
| Scrub Fowls | Megapodiidæ |
| Sea Birds, all | |
| Turkeys, Plain and Scrub or Brush | Otididæ and Megapodiidæ |
| Waders | Charadriidæ |
| Water Rails | Rallidæ |

*Close Seasons.*

In District No. 1, from the first day of September in each year to the thirty-first day of March in the following year, inclusive.

In District No. 2, from the first day of November in each year to the thirty-first day of May in the following year, inclusive.

(With the exception of emus on prickly-pear infested lands, where the close season shall be from the first to the seventh day of July in each year.)

For districts, *see* map.

## PENALTIES.

If any person shall wilfully kill or destroy any protected native bird, or shall use any instrument whatever, net, or other means for the purpose of killing or destroying any native birds, within the periods hereinbefore mentioned, such person shall, upon conviction, **pay a fine of not less than one pound or more than five pounds.**

If any person shall buy, sell, or knowingly have in his possession, house, or control any native bird at any time within the period hereinbefore mentioned, he shall **pay a penalty not less than one pound or more than five pounds for every bird.**

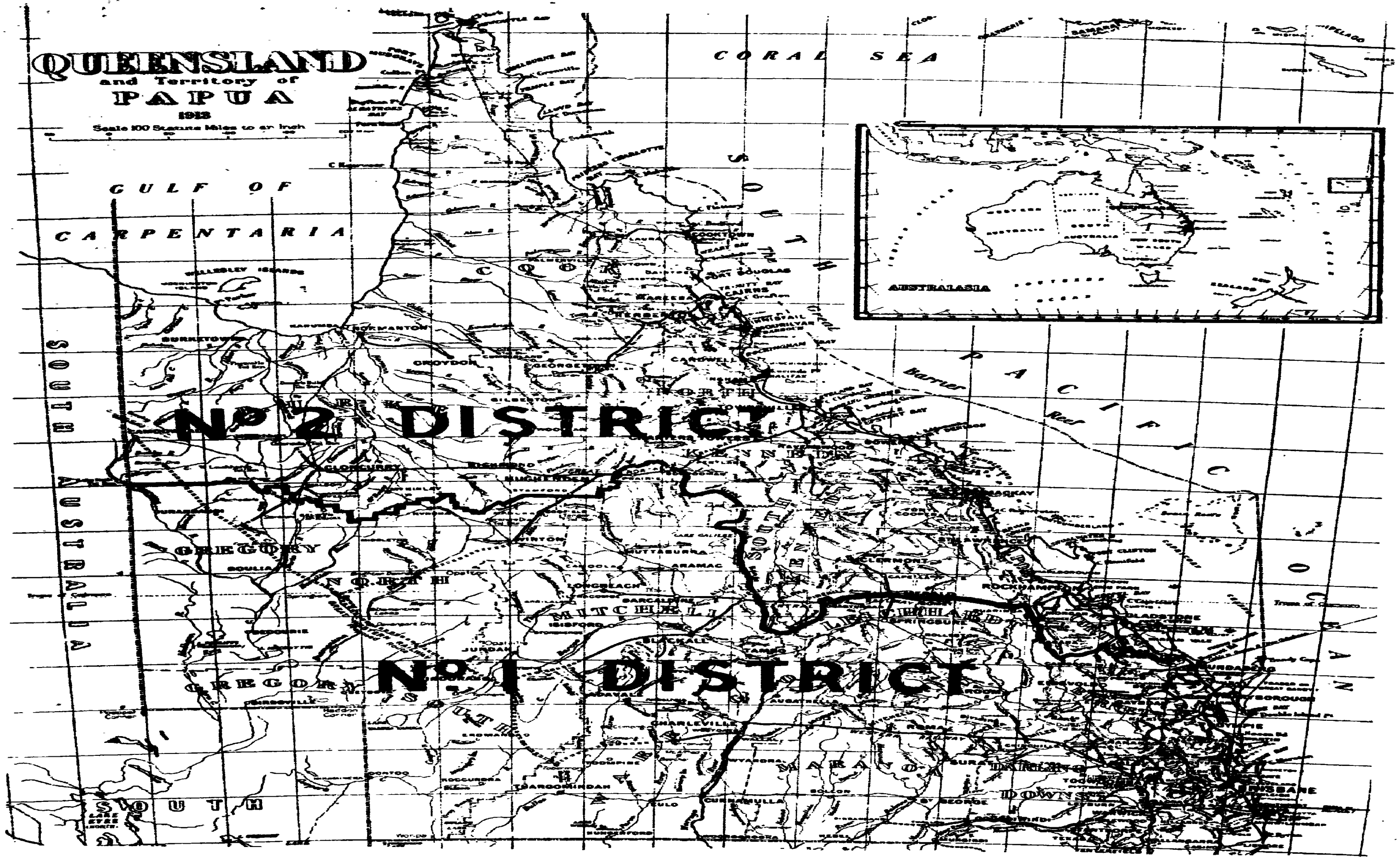
If any person wilfully kills, destroys, or captures any native bird, or uses any instrument, net, or any other means whatever for the purpose of killing, destroying, or capturing any such bird, while it is within or flying over a reserve, he shall be liable upon conviction to pay **a fine of not less than one pound or more than five pounds.**

A moiety of every penalty recovered under the Act shall be paid to the person or persons laying the information.

# LIST OF RESERVES WITHIN WHICH THE DESTRUCTION OF NATIVE BIRDS IS PROHIBITED DURING THE WHOLE YEAR.

| Situation of Reserve. | For Proclamation and Boundaries see *Government Gazette.* Date. | Part. | Page. |
|---|---|---|---|
| Parish of Enoggera, county of Stanley (Enoggera Reservoir and Catchment Area) | 29 Aug., 1885 | II. | 769 |
| Parish of Gracemere, county of Livingstone ... ... | 29 Aug., 1885 | II. | 769 |
| Parishes of Toorbul, Beerwah, and Bribie, county of Canning (Pumice Stone Channels and the shores thereof) | 12 Sep., 1885 | II. | 897 |
| **Parishes of Crow's Nest and Douglas, counties of Cavendish and Aubigny* | | | |
| **Parish of Emu Creek, county of Cavendish* ... ... | 10 Oct., 1885 | II. | 1253 |
| **Parish of Douglas, county of Aubigny* ... ... ... | | | |
| Parish of Nerang, county of Ward, Southport ... ... | 5 June, 1886 | I. | 1946 |
| Parishes of Moggill and Indooroopilly, county of Stanley (Gold Creek and Moggill Creek Drainage Areas) | 13 July, 1889 | II. | 797 |
| Parish of Boonara, county of Mackenzie (on the leased part of Boonara Run) | 14 Sep., 1889 | III. | 99 |
| Parishes of Enoggera and Indooroopilly, county of Stanley (Mount Coot-tha Reserve) | 20 Dec., 1890 | III. | 1403 |
| Parish of Oxley, county of Stanley (Chelmer Recreation and Water Reserve) | 4 Mar., 1893 | I. | 670 |
| Parish of Hewittville, county of Livingstone (Reserve for Water, Emu Park) | 18 July, 1893 | II. | 583 |
| Parish of Ossa, county of Carlisle, Seaforth ... ... | 1 Jan., 1893 | I. | 21 |
| Parishes of Cressbrook, Bowman, and Neara, county of Canning | 11 June, 1893 | I. | 1596 |
| Lake Clarendon ... ... ... ... ... ... ... ... | 24 Mar., 1900 | I. | 961 |
| England and Clarendon ... ... ... ... ... ... | 25 June, 1900 | I. | 1650 |
| Fitzroy, Nicholson, Faraday, Caliorau ... ... ... | 6 July, 1901 | II. | 564 |
| Gavial and Gracemere (The Duck Pond) ... ... ... | 13 July, 1901 | II. | 633 |
| Horseshoe Lagoon, parish of Selkirk ... ... ... | 16 Aug., 1902 | II. | 421 |
| Cloyna ... ... ... ... ... ... ... ... ... ... | 28 Dec., 1901 | III. | 990 |
| Parishes of Antill and Jarvisfield ... ... ... ... | | | |
| Parish of Jarvisfield (Church Lagoon) ... ... ... | 30 July, 1904 | II. | 249 |
| Ditto (Red Lily Lagoon) ... ... ... | | | |
| Parish of Rockhampton (Murray's and Jardine's Lagoons) | 27 Aug., 1904 | II. | 493 |
| Parish of Charters Towers (Burdekin Weir) ... .. | 29 Oct., 1904 | II. | 901 |
| Dunk, Kumboola Island, and Mount Islet, the Family Islands (comprising Thorpe, Richards, Wheeler, Coombe, Bowden, Smith, and Hodson Islands), and Brooks Islands | 13 May, 1905 | I. | 1546 |
| Parish of Yeerongpilly (Russell Wilkins) ... ... | 16 Dec., 1905 | II. | 1273 |
| Ditto (Water Reserve) ... ... | | | |
| Parish of Enoggera (Private lands on Toowong Creek) | 11 Aug., 1906 | II. | 274 |
| Parish of Yaamba (P. F. MacDonald's property) ... | 8 Sep., 1906 | II. | 514 |
| Parish of Noogoon (Mud Island) ... ... ... ... | 8 Dec., 1906 | II. | 1195 |
| Parish of Broadmere (Lake Murphy ... ... ... | 13 Feb., 1909 | I. | 341 |
| County of Stanley (The Redcliffe Shire) ... ... ... | 20 Mar., 1909 | I. | 738 |
| Parishes of Wyseby and Aubrey (Stud Farm for Breeding Police Horses) | 10 July, 1909 | II. | 70 |
| Parish of Pentland (Pentland Dam and Swamp) ... ... | 24 July, 1909 | II. | 220 |
| Parish of Dugandan (A. J. McConnell's property) ... | 4 Sep., 1909 | II. | 587 |
| County of Nares (The Douglas Shire) ... ... ... | 16 April, 1910 | I. | 1002 |
| County of Elphinstone (Abattoir Reserve, Townsville) ... | 21 May, 1910 | I. | 1326 |
| Parish of Taylor, Toowoomba District (Jubilee Park), Redwood Park, Picnic Point, and One-tree Hill) | 8 Oct., 1910 | II. | 1010 |
| Parish of Tingalpa (Shire of Wynnum) ... ... .. | 18 Feb., 1911 | I. | 930 |
| Gladstone Land Agent's District (Capricorn Group of Islands) | 5 Aug., 1911 | II. | 422 |
| Mackay Land Agent's District (Orphanage Swamp and Denman's Water Hole) | 23 Sep., 1911 | II. | 820 |
| Parishes of Rockybar and Eumara (Reeves Lake, &c., on Eumara and Gainsford Holdings) | 29 June, 1912 | I. | 1711 |
| Shire of Widgee ... ... ... ... ... ... ... ... | 20 Dec., 1913 | II. | 1741 |
| Parish of Stradbroke (Myora) ... ... ... ... ... | 11 April, 1914 | I. | 1036 |
| Shire of Maroochy ... ... ... ... ... ... ... ... | 2 May, 1914 | I. | 1173 |
| County of Ward, area on coast from Southport to Pt. Danger | 4 July, 1914 | II. | 78 |

* Note.—These reserves are for the protection of the following birds only:—Tallegallas or Scrub Turkeys, Bronzewing and all Wild Pigeons, Emus, Regent Birds, Quails.


QUEENSLAND
and Territory of
PAPUA
1913
Scale 100 Statute Miles to an Inch
CORAL SEA
GULF OF
CARPENTARIA
SOUTH PACIFIC OCEAN
The Great Barrier Reef
AUSTRALASIA
SOUTH AUSTRALIA
Nº 2 DISTRICT
Nº 1 DISTRICT
COOK
NORTH KENNEDY
SOUTH KENNEDY
GREGORY NORTH
MITCHELL
LEICHHARDT
GREGORY SOUTH
WARREGO
MARANOA
DARLING DOWNS
BURKETOWN
NORMANTON
CROYDON
CLONCURRY
HUGHENDEN
CHARLEVILLE
ROCKHAMPTON
MACKAY
CAIRNS
BRISBANE
SOUTH

# Answers to Correspondents.

## STRIGA PARVIFLORA.

Above is the name given by the Colonial Botanist to a weed sent him for identification from Bundaberg by Mr. H. T. Harvey, Instructor in Cane Culture. The latter gentleman says:—"It grows on several of the farms; some of the farmers hold the opinion that it is able to kill out sugar-cane to a very remarkable degree. It is a small, insignificant-looking weed, and only grows in small patches. I carefully examined it and found that the roots of the weed are able to attach themselves to the cane roots in a very similar way to the manner in which dodder and other parasitic plants attach themselves to the stems of lucerne, &c. But I am by no means certain that it is so destructive to cane as the farmers say it is. The sample sent consists of the whole plant, together with a little attached soil with cane roots in it. The plant only grows from 6 to 8 in. high, consists of a single stalk, has curious underground leaves or bracts, bears tiny pink flowers, and the roots contain a lot of tiny knobs. Where the roots attach themselves to the cane roots, a knob is always formed." Mr. Bailey says:—"The plant belongs to *Striga parviflora*, a small native plant. The genus *Striga* consists of about thirty species spread over the hotter parts of Africa, Asia, and Australia, and in the two former places have been recorded as parasitic, or half-parasitic, on a number of different plants. Some specimens of the present species were handed over to me with similar remarks by Mr. G. B. Brooks, Instructor in Agriculture, some two years ago. I would have answered this note before, but it was received in the midst of moving into new quarters, and the matter could not be answered at once."

## BROOM MILLET.

A. E. Carey, Nambour—

In response to your inquiries *re* growing and baling of broom millet:—Quantities of hurl are marketed in Brisbane done up in neat bundles unbaled. Although baling adds to the appearance, this difficulty can be got over by using a home-made press. A lucerne or other hay press can be used, the main object of baling being to reduce the bulk and consequently the freight charge. The most important factor in preparing broom millet for market is the classification and grading of the fibre. Under separate cover we send you the Departmental pamphlet on the subject.

## GRADING COTTON.

Cotton.—Chinchilla.

With the present methods of buying cotton, especially the short staple varieties ($\frac{3}{4}$ in. to $1\frac{1}{16}$ in.), other things being equal, the grade practically determines the price that is received by the producer. What is known as staple cotton ($1\frac{1}{8}$ in. staple or above) is usually sold on sample. The sample gives each party to the trade a chance to form his own opinion, and is necesary because cotton dealers and spinners have such different ideas about the character and length of staple.

Low Middling, Middling, and Good Middling cover the bulk of white cotton grown in an average season, and a knowledge of these three grades is usually sufficient for the grower's use.

Middling, as the name shows, is the middle or basic grade, and is the grade upon which the market quotations are based. All grades above Middling bring a higher price and all below Middling bring a lower price than that quoted for Middling, the amount above or below varying according to the respective differences in use where the cotton is marketed.

Many more grade names are used by the trade in the large spot markets to describe the different classes of coloured cottons. The grades of white cotton, however, are the foundation of all these other classes. When the cotton is not white, its nature is indicated by adding the words "off colour" or "fair colour," "spotted," "tinged," or "stained," as the case may be, to the grade given to the sample. In other words, there may be several classes of the same grade of cotton—*e.g.*, Middling "off colour," Middling "tinged," or Middling "stained."

The grade of a sample of cotton is determined by the quantity of leaf, dirt, sand, motes, neps,* gin-cut or stringy fibre, and cut seed it contains, together with its colour.

Cotton should be dry when ginned, and the saws, brushes, and other parts of the gin should be in good condition if a smooth sample is to be obtained.

Cleaners used in connection with the ginning will improve the cotton from one to two grades.

Early pickings should neither be mixed nor ginned with later pickings that are of a lower grade, since the price paid for a bale of cotton is based on the lowest grade it contains rather than on the highest grade.

Cotton should not be exposed to the weather; moisture causes it to mildew and so lowers the grade.

## RE "MURIATE OF SODA."

R. T. G. CAREY, Beerwah—

Mr. J. C. Brünnich, Agricultural Chemist, says:—Muriate of soda is common salt, and is only in some cases of benefit as manure, for a few crops like mangolds, cabbages, &c. If salt is applied in large amounts it will sterilise soil and retard growth of plants. It is used in quantities from 2 to 3 cwt. per acre as a top-dressing. It appears to have a slight action in rendering some potash in soil available to plant growth, and therefore its use may economise the necessary application of potash manures. Salt appears also to have a deterrent effect on slugs, cutworms, grubs, &c.

"SELECTOR," Gradule—

Your letter of 9th October was submitted to Mr. H. C. Quodling, Agricultural Inspector, who replies to your questions as follows:—

1. Trees may be poisoned at any time of the year, preferably March and April. Trees should be poisoned at the same time as being rung.
2. The treatment used is one of the cheapest and most effective.
3. The arsenic has no after-effects on the land and grass.
4. The best time to ring green timber is when the sap is up.

* Neps look like small white dots, and are best seen when a thin layer of the cotton fibres is held toward the light.

# The Markets.

## PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR OCTOBER, 1914.

| Article. | | OCTOBER. Prices. |
|---|---|---|
| Bacon | lb. | 8d. to 10½d. |
| Bran | ton | £7 |
| Butter | cwt. | 108s. |
| Chaff, Mixed | ton | £4 to £5 15s. |
| Chaff, Oaten (Victorian) | " | £6 15s. to £7 |
| Chaff, Lucerne | " | £4 10s. to £7 |
| Chaff, Wheaten | " | £5 10s. |
| Cheese | lb. | 6¾d. to 7d. |
| Flour | ton | £9 10s. |
| Hams | lb. | 1s. 2d. |
| Hay, Oaten (Victorian) | ton | £7 to £7 10s. |
| Hay, Lucerne (Prime) | " | ... |
| Honey | lb. | 2½d. |
| Maize | bush. | 3s. 3d. to 3s. 3½d. |
| Oats | " | 3s. 11d. to 4s. |
| Onions | ton | £14 |
| Peanuts | lb. | 3d. to 3½d. |
| Pollard | ton | £6 to £7 |
| Potatoes | " | £12 to £14 |
| Potatoes (Sweet) | cwt. | 4s. to 4s. 3d. |
| Pumpkins | ton | £2 to £2 5s. |
| Wheat, Milling | bush. | 3s. 4d. |
| Eggs | doz. | 7d. to 8d. |
| Fowls | pair | 4s. to 5s. 6d. |
| Geese | " | ... |
| Ducks, English | " | 3s. 9d. to 4s. |
| Ducks, Muscovy | " | 4s. 6d. to 5s. 6d. |
| Turkeys (Hens) | " | 8s. 6d. to 9s. 3d. |
| Turkeys (Gobblers) | " | 12s. to 20s. |

## SOUTHERN FRUIT MARKETS.

| Article. | OCTOBER. Prices. |
|---|---|
| Bananas (Queensland), per case | 14s. to 16s. |
| Bananas (Fiji), per case | 19s. 6d. to 24s. |
| Mandarins (Queensland), per case | 9s. to 14s. |
| Oranges (Navel), per case | 8s. to 13s. |
| Oranges (Seville), per case | 5s. to 6s. |
| Oranges (other), per case | 8s. to 12s. |
| Passion Fruit, per half-case | 2s. to 7s. |
| Pineapples (Queens), per case | 7s. to 10s. |
| Pineapples (Ripleys), per case | 7s. to 8s. |
| Pineapples (Common), per case | 7s. to 8s. |
| Tomatoes, per quarter-case | 4s. to 6s. |

## PRICES OF FRUIT—TURBOT STREET MARKETS.

| Article. | OCTOBER. Prices. |
|---|---|
| Apples, Eating (Tasmanian), per case | 8s. to 12s. |
| Apples (Cooking), per case | 6s. to 7s. |
| Bananas (Cavendish), per dozen | 3d. to 7d. |
| Bananas (Sugar), per dozen | 2d. to 4d. |
| Cape Gooseberries, per quarter-case | 5s. 6d. to 7s. |
| Citrons, per cwt. | 10s. to 10s. 6d. |
| Cocoanuts, per sack | 12s. to 14s. |
| Cumquats, per case | 1s. 6d. to 2s. 3d. |
| Custard Apples, per quarter-case | 2s. 6d. to 6s. |
| Lemons (Local), per case | 6s. 6d. to 9s. |
| Lemons (Imported), per case | 6s. to 10s. |
| Mandarins, per case | 6s. to 10s. |
| Oranges (Navel), per case | 5s. to 8s. |
| Oranges (other), per case | 4s. to 7s. |
| Papaw Apples, per quarter-case | 1s. to 1s. 6d. |
| Passion Fruit, per quarter-case | 9s. to 10s. |
| Persimmons, per quarter-case | ... |
| Peanuts, per pound | 3½d. |
| Pears, per quarter-case | ... |
| Pineapples (Ripley), per dozen | 1s. 6d. to 4s. 6d. |
| Pineapples (Rough), per dozen | 1s. to 1s. 6d. |
| Pineapples (Smooth), per dozen | 1s. 6d. to 3s. 6d. |
| Rosellas, per sugar bag | ... |
| Strawberries, per dozen pint boxes | 4s. to 7s. 6d. |
| Strawberries, per tray | ... |
| Tomatoes | 3s. 6d. to 6s. 6d. |

## TOP PRICES, ENOGGERA YARDS, SEPTEMBER, 1914.

| Animal. | SEPTEMBER. Prices. |
|---|---|
| Bullocks | £14 15s. to £17 17s. 6d. |
| Cows | £9 15s. to £13 2s. 6d. |
| Merino Wethers | 25s. |
| Crossbred Wethers | 22s. 3d. |
| Merino Ewes | 19s. |
| Crossbred Ewes | 20s. 6d. |
| Lambs | 20s. 3d. |
| Pigs (Porkers) | 43s. |

# Statistics.

## RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF SEPTEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING SEPTEMBER, 1913 AND 1914, FOR COMPARISON.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|
| | Sept. | No. of Years' Records. | Sept., 1914. | Sept., 1913. |
| *North Coast.* | In. | | In. | In. |
| Atherton ... ... | 0·46 | 13 | 2·15 | Nil |
| Cairns ... ... | 1·04 | 27 | 1·75 | 0·08 |
| Cardwell ... ... | 1·32 | 27 | 0·73 | 0·04 |
| Cooktown ... ... | 0·57 | 27 | 1·25 | 0·49 |
| Herberton ... ... | 0·44 | 27 | 1·50 | 0·05 |
| Ingham ... ... | 1·16 | 22 | 0·47 | 0·04 |
| Innisfail ... ... | 3·03 | 27 | 8·75 | 0·04 |
| Mossman ... ... | 0·79 | 5 | 1·85 | 0·32 |
| Townsville ... ... | 1·30 | 30 | Nil | Nil |
| *Central Coast.* | | | | |
| Ayr ... ... ... | 1·90 | 27 | 0·04 | 0·02 |
| Bowen ... ... | 1·15 | 27 | 0·23 | 0·28 |
| Charters Towers ... | 0·84 | 27 | 0·18 | 0·30 |
| Mackay ... ... | 1·75 | 27 | 0·92 | 0·24 |
| Proserpine ... ... | 2·21 | 11 | 3·60 | 0·25 |
| St. Lawrence ... | 1·29 | 27 | 0·85 | 0·16 |
| *South Coast.* | | | | |
| Crohamhurst ... | 2·10 | 20 | 2·26 | 3·98 |
| Biggenden ... ... | 1·48 | 14 | 0·73 | 4·11 |
| Bundaberg ... ... | 1·81 | 27 | 0·84 | 1·52 |
| Brisbane ... ... | 2·04 | 63 | 0·82 | 2·54 |
| Childers ... ... | 1·95 | 19 | 1·31 | 2·44 |
| Esk ... ... ... | 2·30 | 27 | 0·96 | 3·07 |
| Gayndah ... ... | 1·63 | 27 | 0·78 | 3·44 |
| Gympie ... ... | 2·22 | 27 | 1·46 | 5·10 |
| Glasshouse M'tains | 1·56 | 6 | 1·59 | 3·32 |
| Kilkivan ... ... | 1·77 | 27 | Nil | 4.52 |
| Maryborough ... | 1·78 | 27 | 2·35 | 1·41 |
| *South Coast—continued:* | In. | | In. | In. |
| Mount Larcom ... | ... | ... | .. | ... |
| Nanango ... ... | 1·96 | 27 | 0·15 | 2·98 |
| Rockhampton ... | 1·34 | 27 | 0·54 | 0·29 |
| Woodford ... ... | 2·14 | 27 | 0·82 | 2·81 |
| Yandina ... ... | 2·14 | 21 | 1·23 | 2·79 |
| *Darling Downs.* | | | | |
| Dalby ... ... | 1·79 | 27 | 0·38 | 1·47 |
| Emu Vale ... ... | 1·86 | 17 | 0·45 | 3·06 |
| Jimbour ... ... | 1·75 | 24 | Nil | 1·62 |
| Miles .. ... | 1·43 | 27 | 0·50 | 0·90 |
| Stanthorpe ... | 2·23 | 27 | 1·04 | 1·75 |
| Toowoomba ... | 2·13 | 27 | 0·41 | 1·41 |
| Warwick ... ... | 1·98 | 27 | 0·34 | 2·25 |
| *Maranoa.* | | | | |
| Roma ... ... | 1·49 | 25 | 0·31 | 0·75 |
| *State Farms, &c.* | | | | |
| Gatton College ... | 1·66 | 14 | 0·48 | 1·40 |
| Gindie .. .. | 0·95 | 13 | Nil | 0·38 |
| Kamerunga Nurs'y | 1·13 | 23 | 3·44 | 0·02 |
| Kairi ... ... | ... | ... | 1·86 | .. |
| Sugar Experiment Station, Mackay | 1·63 | 16 | 1·68 | 0·19 |
| Bungeworgorai ... | ... | ... | 0·58 | 0·81 |
| Warren ... ... | ... | ... | Nil | 0·34 |
| Hermitage ... | 1·56 | 7 | 0·33 | 2·48 |

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for September this year and for the same period of 1913, having been compiled from telegraphic reports, are subject to revision.

# Farm and Garden Notes for December.

Too much care can scarcely be bestowed upon potatoes dug up this month to protect them from the sun. They should be dug or ploughed out as soon as the skin is firm, as they are liable to rot in the ground owing to the great heat.

FIELD.—The wheat harvest will be now nearing completion, and to all appearance the results are not likely to constitute a record, owing to the dry spell of September, and the yield promises to be somewhat unsatisfactory to the wheat-growers. The principal factor operating against a still greater extension of the wheat-growing industry is, that many farmers who formerly grew wheat and barley have turned their attention to dairying, which offers larger and quicker returns.

The dry weather which prevailed during parts of the month of September gave rise to grave fears for the harvest, but the subsequent timely rainfall came just in time to save the crop. The estimates of the probable yield have varied so considerably that it will be well to wait until the harvest is over before calculating on the result.

Given favourable weather, maize, panicum, imphee, Kafir corn, and sorghum may be sown. Arrowroot, ginger, and sweet potatoes may be sown.

KITCHEN GARDEN.—Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered, otherwise the plants will leave off bearing. Seeds of all these may be sown for a succession. Sow cabbage and cauliflower seed. Great difficulty will be experienced in getting these to grow at this season, and the plants will consequently be more valuable in proportion. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Take up onions, and spread them out thinly on the barn floor until the tops wither sufficiently to pull off easily. They should then be graded into sizes, and sent to market or stored in a cool place. Where there is an unlimited supply of water, and where shade can be provided, lettuce and other salad plants may still be sown. All vacant ground should be well manured and dug two spits deep. Manure and dig as the crops come off, and the land will be ready for use after the first shower.

FLOWER GARDEN.—Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked surface, beneath the loose soil. Alternate light with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulaca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. These may still be sown in boxes. Clear away all annuals which have done

flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant them out at once in their new positions. Top-dress all lawns.

# Orchard Notes for December.

## THE SOUTHERN COAST DISTRICTS.

December is somewhat an off month for pines, though bananas should be improving both in quality and quantity. The purely tropical summer ripening fruits are not yet ready, and, consequently, there is only a limited supply of fruit in this part of Queensland during the month.

Early ripening varieties of grapes will mature, and care should be taken to market them in good order. The first fruit to ripen should be put up in small packages, as, if marketed in this manner, it will fetch a better price, but as it becomes more plentiful it can be packed in larger cases.

Pay particular attention during the month to all peaches, apples, pears, Japanese plums, or other fruits that are liable to be attacked by fruit fly, and see that no fly-infested fruits are allowed to lie about under the trees, and thus breed out a great crop of flies that will be ready to destroy the grape and mango crops as they mature.

If the month is dry see that the orchard is kept well worked so as to retain moisture in the soil, and, in any case, even should there be a good rainfall, it is necessary to cultivate in order to keep down weed growth, as if weeds are not kept in check now there is little chance of their being kept in hand once the January and February rains set in.

The planting out of pineapples, bananas, and most kind of tropical fruits can be carried out during the month, especially if there is any rainy weather; but, if the weather is dry, it is better to defer the planting out of tropical fruits till January or February.

The cyaniding of citrus trees can be continued when necessary, and where Maori or orange mite is showing it should be checked at once, as Maori fruit is of no use for the Southern markets, and is unsuitable for export to the old country.

## THE TROPICAL COAST DISTRICTS.

Clean up all orchards and pineapple and banana plantations as long as you have the chance of fine weather, so as to have your land in good order when the wet season commences, as once the rain sets in there is little chance of fighting weeds. Watch bananas carefully for fly, and market the fruit in good order. Handle the crop of pines carefully; don't let the fruit get too ripe, as an over-ripe Northern pine is tasteless. The fruit should be cut as soon as it is fully grown, as even when quite green the rough-leaf varieties have usually developed sufficient sugar to suit most persons' taste. Pack carefully to prevent bruising, and they will carry South in good order.

Only send high-class mangoes South—bad-flavoured sorts, and stringy, carroty, or turpentine flavoured varieties are not worth shipping. High-class fruit will pay to handle carefully, but there is no demand for rubbish, and I am sorry to say that fully 90 per cent. of the mangoes grown in the State must be classed under the latter heading.

Tropical fruits of all kinds can be set out during suitable weather. Fruit pests of all sorts must be systematically fought.

## THE SOUTHERN AND CENTRAL TABLELANDS.

December is a busy month for the growers in the Stanthorpe district. Early apples, plums, peaches, nectarines, &c., will ripen during the month, and must be marketed as soon as ripe, as they do not keep long once they are gathered. Handle carefully, and grade better; there is far too much early rubbish slumped on to the local markets, which tends to spoil the demand as well as the price. Watch the orchards very carefully for Codling moth and fruit fly, and take every possible precaution to keep these pests in check should they make their appearance, as the future cleanliness of the orchard depends very largely on the care that is taken now to keep these pests in check.

If the month is dry, keep the orchard and vineyard well cultivated. Watch the vines carefully so as to detect the first signs of Oidium or Anthracnose, and systematically fight these pests, remembering always that in their case prevention is better than cure, and that only prompt action is of the slightest value.

On the Darling Downs every care must be taken to keep the fruit fly in check, and on no account must infested fruit be allowed to lie about under the trees, as this is far and away the best method of propagating the pest wholesale.

In the Central District the grape crop will ripen during the month. Handle the fruit carefully. Cut it when dry, and where it has to be sent long distances to market pack in 6-lb. baskets rather than in larger cases. Where dry keep the orchard and vineyard well cultivated, and where the citrus and other fruit trees require it give them an irrigation. Don't irrigate grape once the seeds have been formed, as it tends to deteriorate the quality, and to make the fruit tender and consequently to carry badly.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. II. DECEMBER, 1914. PART 6.

# Agriculture.

## NOTES ON TOBACCO CULTURE.

BY NICHOLAS SACHOULIS, Turkish Cigarette Tobacco Grower and Expert, Inglewood.

### PLANT-BEDS.

Burn the site. Well-burned "beds" give the most satisfaction, as burning destroys the vegetable and insect life. Select for your seed-bed fresh land near the water where it is not shaded. Do not burn when the ground is wet. Close sides with brick or timber 6 to 8 in. high; allow the ashes to remain on the bed, spade up twice and cross to the depth of 9 to 12 in., so that the ashes are well mixed with the soil; rake until the ground is well pulverised.

Sow seed with ashes. Do not make beds too narrow—3 ft. by 30 in.; sow two teaspoonfuls of seed to 100 square feet, and then take a board and press the surface so the seed is well covered with soil. After sowing, the beds should be covered with grass laid flat on the ground. Water the beds at once, using 15 gallons of water to every 100 square feet. When the plants begin to grow, water then twice a week, removing the coverings, and after rain take the grass off altogether. Cover the beds with open calico to make them insect proof. When the plants have four to six leaves, do not water them too much—only use just enough to keep them healthy. Thin out the plants and pull up any weeds, but these latter are not likely to be troublesome on "burnt" beds.

## SELECTION OF SOIL.

For the production of bright pipe tobacco or Turkish cigarette-leaf, the soil must contain a large percentage of sand. The sandy bank areas of the Inglewood district includes some excellent soils for Turkish, and, when the rainfall is sufficient, for cigar and Virginia types as well. Many of the granite soils will grow good Turkish. Among our best soils for all types are the reddish sandy loams created by the blending of granitic and gold belt soils; these often have both the texture and the fertility. Volcanic, heavy black, or red soils grow a leaf too coarse and heavy for market requirements, and soils containing "Brack" or alkali should always be avoided.

All tobacco soils should have good natural drainage, and it is of particular moment to note whether granitic soils are underlaid with an impervous subsoil. New land or those freshly broken up from grass produce the brightest-coloured leaf, but their use is conditional on their being worked up to a perfect tilth before planting time.

## PREPARING LAND.

The preparation of the land should not be left until the planting season, but should be done as early as possible. Two ploughings, cross-furrowing, and two harrowings will be sufficient. Work the fields up to garden tilth and keep them so by harrowing soon after every rain. Cultivation is one of the secrets of success in tobacco culture as well as any other crop culture, and it is just as important before planting as afterwards.

Tobacco plants that have been raised under cover should now be planted out as early as possible this month.

## TRANSPLANTING.

Use strong, healthy plants only. Water bed before drawing plants; do not draw much ahead of planting requirements. Do not mix varieties. Give each variety the correct distance. Set the plants firmly; do not leave them dangling in a hole. Do not plant in a depression where soil can be washed over them. Define rows with a home-made marker.

For heavy pipe-tobacco, the plants should be set in straight rows 3½ ft. apart; for cigar-leaf, the rows should be 3½ ft. by 20 in. apart in the row; for cigarette-leaf, 3 ft. by 15 in.

The plants should be about 6 in. high when they are ready for transplanting and should be removed very carefully, and should not be allowed to get broken or dirty. Hollow out the place they are to be set in with a dibble—a pointed piece of wood. See that the hole is made large enough to allow the fibres of the roots to go straight down, and not allowed to double up or get twisted. Do not splash the water on the plants, but pour it in a hole beside them. Transplanting must be done at 4 o'clock in the afternoon after rain or in cloudy weather. Next morning the plants should be carefully covered over with light grass, to protect them from the heat of the sun till they have started growing. If dry weather prevails, each plant should be liberally supplied with

water. Do not remove the grass when watering. Healthy plants take root in a week's time. After rain remove the grass altogether.

Remarks:—Better to plant out 300 to 500 a day, and look well after them, than 5,000 and leave them alone. Covering the plants in the field is the best means of ensuring success for the tobacco-grower. Replace misses as soon as convenient, and thus secure an even stand.

## INSECTS.

Flocks of turkeys, ducks, and fowls will hold these in check. Poison is the best thing. For grasshoppers and beetles, spray field and border with Paris green or arsenate of lead, 1 lb. making up to 50 gallons of spray.

## CULTIVATION OF THE CROP.

When the plants have taken root, keep the soil thoroughly stirred by means of hand and horse propelled implements. Do not permit earth to cake around the plants. Weeds are a breeding-place for fungoid diseases and insects. Good leaf depends upon rapid and constant growth. The growth is in a large measure dependent upon the degree of cultivation. With a hoe lighten the ground and remove all the weeds from the plants, giving them a chance to start with their growth.

When the plants are 8 to 10 in. high, if it is possible, after rain the horse hoe should be run between the rows. Nothing can be better than this tool; it is an ideal implement for hoeing between the rows, earthing up tobacco plants, and keeping the field clean for growing crops.

Topping, pruning, and suckering will be dealt with in a future article in the Journal.

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# MARKETING FARM PRODUCE.

From the earliest days of farming in Queensland to the present time, the carelessness of some farmers in preparing their produce for market, whether oversea or by rail, has been proverbial. Anything in the shape of old, patched bags, or old disease-germ-carrying fruit-cases, was good enough, provided they were cheap and that they could be sent away from the farm before they burst or broke. Time and again, advice has been given as to the great benefit of getting up grain, hay, or fruit in an attractive manner, by which means a constant demand for well-got-up produce is always assured. Too often has this advice fallen upon deaf ears, notwithstanding clear evidence that the "shopping" as it may be called, of the goods—that is, presenting it in a marketable condition—invariably results in better prices and a certain demand. The baling of hay in an attractive style is an instance in point, and it must be confessed that much Queensland hay is not always marketed in a manner most likely to attract buyers. A little time ago some chaff was offered for sale in Brisbane, when the average price was £5 5s. per ton, and this particular consignment had to be sold for £3 10s. per ton, mainly on account of its clumsy make-up. Fruit, again, is often shipped

ungraded. A customer who finds cases containing fruit of all sizes is not likely to prefer this to cases of evenly-sized fruit.

Then, take the case of maize, wheat, and millet. Patched bags containing such produce are frequently in evidence. That this statement is correct, we can show by the fact that a merchant in Melbourne, who imports Japanese millet largely from Brisbane, makes complaints of the wretched condition of the bags the grain is shipped in. At the end of October, he received a consignment of 130 bags of Japanese millet. Of these, fully 120 were not fit for resale purposes. Each lot had to be rebagged on arrival; some of the bags were sewn with haybands, whilst a good proportion of the bags had huge holes that were partially sewn up with hayband. The merchant stated that in all his thirty years' experience he had never seen such inferior bags shipped, and he would not offer them for sale. During this season, he had purchased from Brisbane 2,000 bags of Japanese millet seed. To show the extent of loss owing to bad bagging, it is pointed out in this particular case that it is very difficult to secure a claim after weighbridge tickets have been produced, and this will mean that New South Wales will benefit by this merchant's orders for further shipments of Japanese millet, unless departmental action can prevent the exportation of valuable seed in inferior sacks. The South African law in relation to the export of grain and seeds is: New sacks—just as the Queensland law applies to new fruit-cases. This matter has seriously been considered by the Department of Agriculture, and we understand that action is being taken to prevent the shipping of farm produce unless in such a condition and in such packages as are approved by the Department.

In England, the various railway companies, as public carriers, provide bags for their clients, as well as trucks; so that, when a farmer wants bags, he has simply to tell the nearest station-master that he wants so many bags on a certain day. He receives them and has the use of them for three days, for which he pays one-halfpenny each. Within the three days, he fills the bags, and loads them on to the trucks, and his responsibility ceases. No charge is made for the bags during transit. The consigner has the same privilege as the sender.

## PURE SEEDS ACT.

Following are the new regulations in connection with the Pure Seeds Acts of 1913 and 1914:—

1. " Kind " shall mean the variety of the order of a plant, grown from the seed, as known in the seed trade, at a place where the seed was grown.

2. " Foreign ingredients " shall include stalks, husks, shells (other than those normally adhering to seeds), earthy matter (including sand and gravel), seeds of weeds (detailed in Schedule C), and seeds other than those specified in the invoice.

3. " Low-grade seed or seeds " shall mean the kind of seeds in which the amount of foreign ingredients, including weed seeds, does not exceed

the proportion or amount set forth in Schedule B, but in which the amount of non-germinable seed may be not more than 50 per cent. in excess of the amount set forth in Schedule B.

4. The regulations shall not apply to—(*a*) Seed that is sold direct to seed merchants, to be cleaned and graded before being offered for sale; (*b*) seed that is held in storage for the purpose of being cleaned or recleaned, and which has not been offered, exposed, or held in possession for sale; (*c*) seeds indented from countries beyond Australia for planting for green manure.

5. The weights of seeds to be taken as samples for purposes of examination shall not be less than as mentioned and set forth in Schedule A.

6. The proportion or amount of "foreign ingredients," including dead, diseased, insect-infested, and non-germinable seeds, which may be contained in any quantity of any kind of seed shall not exceed the proportion or amount set forth in Schedule B, except in the case of low-grade seeds; (*d*) all invoices and labels relating to these regulations.

7. No seeds shall be sold as low-grade seeds unless—(*a*) Contained in bags or packages, which must be branded on the outside, on both sides of the bag from top to bottom, with a red stripe at least two inches wide; (*b*) Inside each bag or package containing such low-grade seeds there is enclosed and displayed on top of the opened bag or package a red label (measuring at least six inches by four inches), and bearing in heavy type, black letters, the words "Low-grade seeds"; (*c*) all invoices and labels relating to such seeds are distinctly marked with "Low-grade seeds" in red type, following the name of the seed.

8. The fee for a copy of the result of any examination of any sample of seed, payable under subsection (2) of section 9 of the Act, shall be two shillings and sixpence.

9. Any person guilty of any contravention of these regulations shall be liable to a penalty not exceeding £10.

Schedules are appended setting forth the maximum amount of foreign ingredients permitted in seeds and the percentage of dead non-germinable seeds allowed while another schedule contains a list of weeds.

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## POTATO-GROWING IN THE CENTRAL AND NORTHERN DISTRICTS.

By G. B. BROOKS, Instructor in Agriculture.

In regard to potatoes, Queensland has to depend upon the Southern States for a large share of her requirements. During the last year, statistics show that some 400,000 bags were imported into our State from outside sources.

When we consider that good prices have been ruling for this product for some considerable time, that there are extensive areas of soil suitable for potato culture, and that the climatic conditions over a large portion of the State are such that they permit the growing of two crops during the year—instances not being rare where three have been secured off

the same land during the twelve months—the question is forced upon us: "Why cannot we supply our own requirements?"

It must be admitted that in several of our older agricultural districts in the Southern portion of the State, the potato is being largely grown and the methods adopted in the raising of such are fairly well understood.

In the Central and Northern areas this indispensable article of diet is not cultivated to any extent, although around Townsville some consideration is being given to the question of supplying local requirements.

## CLIMATIC CONDITIONS.

Unfortunately, many of the settlers in these districts look upon this product as being essentially a temperate climate one, and give little attention to its culture. The low yields thereby obtained are therefore credited to unsuitable climatic conditions rather than to the mistakes made in the raising of the crop.

The fact must not be lost sight of that conditions of climate, temperature, moisture, &c., determine, to a very large extent, the class of crop that can be profitably raised in a given district. For example, it would be absurd to advise farmers to engage in wheatgrowing on the tropical coast, and it would be equally foolish to recommend those in the Darling Downs to take up cane culture.

The potato is a plant, however, that, although usually grown in cool districts, can adapt itself to a very wide range of climate, being successfully raised in Iceland as well as in Central Australia.

Although capable of production under both arctic and tropical climes, the farmer who is out after high yields has to recognise that temperature is the controlling factor in the securing of such. To be successful, extremes of temperature have to be avoided. The advent of very hot weather while the crop is maturing results in largely decreasd yields and a poor-quality tuber, while a fairly heavy frost invariably means total destruction. It is therefore apparent that the growing season lies between those two points—high temperature and frost.

Every effort should be made to mature the crop during the cool months—of course, avoiding frost.

In districts free from such, the growing period is fairly lengthy, thus allowing a good deal of latitude in regard to planting, but in localities where there is a danger from low temperatures, two crops are grown; these are known as the summer and winter crops, one maturing before the advent of frost, the other being planted immediately after. The period favourable for the production of high yields and quality is, by this division, considerably shortened—so reduced in fact, that there is not a scrap of margin left for the farmer to work on. To ensure a full crop everything must be in order at the right time. Land in best of tilth, the necessary moisture conserved to ensure immediate germination, together with well-sprouted seed of a variety suitable to local conditions.

In some of our potato-growing districts, experience has taught the farmer the detrimental effect of hot weather on a late-maturing summer crop.

I have seen whole fields that, although looking the picture of health, failed to produce a single potato worth digging. The forcing effect of heat, together with a plentiful supply of moisture coming before the tubers set, caused the plants to run to top or haulms.

The effect of this has been that many growers have shifted the planting season for the summer crops forward by about a fortnight, taking the risk of having their crop cut down by a late frost, knowing that if they escape a largely increased yield will be secured.

It will be seen by the above remarks that, for the summer crops, planting must be undertaken immediately all danger of heavy frost is over, while for the winter crop this operation should be deferred until the hot weather has passed—just leaving sufficient time for the crop to mature before a cold snap, severe enough to check growth, is likely to be experienced.

## PREPARATION OF THE LAND.

From what has already been said, it will be observed that successful potato culture largely depends upon the getting of the crop into quick growth. This end cannot be secured altogether by early planting even with well-sprouted seed. The necessary moisture must be present, together with a supply of readily available plant food. The means by which these essentials can best be secured is by adapting a system of early preparation of the land. This point is of such importance in potato-growing that I think it could be laid down as an axiom that "the man who prepares his land three months ahead of planting has cultivated for a 5 to 7-ton crop in a good season and a 2-ton crop in a bad, while the man who prepares his land a few weeks ahead of planting has cultivated for a 30-cwt. crop in a good season and a total failure in a bad."

Incidentally, it may be mentioned that this applies to other crops as well, and if put into effect would undoubtedly be the means of doubling the returns.

In potato culture the soil should be put into thorough tilth. Deep cultivation should be practised—8 in. at least; 10 in. if the soil will permit.

## SOIL.

A potato soil consists of a well-drained friable loam. Soils inclined to bake should be avoided, but these can be vastly improved by the ploughing under of green manure, such as cowpea or beans. Heavy, stiff soils should be treated to an application of lime.

## SEED.

In the warm portions of the State great care should be exercised in the selection of varieties suitable for local conditions as well as securing sets that have commenced to sprout. Unquestionably, the planting of unsuitable sorts, together with backward seed, has been the cause of many failures and poor returns.

For the summer crop, at least, preference should be given to early and medium varieties. Late-maturing sorts are invariably liable—if

growth is at all retarded—to make second growth, giving a badly shaped, unprofitable tuber of poor quality.

"Up to Date" and "Brownell's" are varieties that do particularly well in the North, while "Circular Head" (also known as "Blue Skins") are of the type that develop second growth.

## PLANTING.

In localities where heavy rainfall is at all likely to occur during growth, planting in ridges or hills is recommended. In drier situations, raising the crop on the "flat" is more desirable; the plants to be slightly hilled up as a protection from heat and insect pests.

The ridges or hills should not be pointed, but set up with a V depression on top, as illustrated.


The advantages of the V-shaped hill are: It better conserves the moisture; germination is much quicker, there being a less depth of soil to penetrate; and the crop can be harrowed after showing through, without harm.

When water is available at a reasonable depth and land suitable, profitable potato-growing can be practically assured. Two waterings are invariably sufficient to ensure a crop, even without any rainfall; the second to be applied just when the tubers are beginning to form.

Information in regard to manures, diseases, &c., are dealt with in the pamphlet, "The Potato," which can be procured by making application for same to the Department of Agriculture.

## EXTENDING THE AREA UNDER FOOD CROPS IN QUEENSLAND.

The Royal Commission on Food Supplies and on Trade and Industry during the war has reported to His Excellency the Governor-General that, if the war is prolonged for a year or more, the pressure on food supplies is likely to become acute.

The full effect will be felt of the destruction of and failure to reap some crops in France, Belgium, Austria, and partly Russia, and there is an expected shortage in the Canadian and Australian wheat crops.

The feeding of Great Britain and of the Allies is of the utmost importance, and the Minister for Agriculture hopes that the farmers of Queensland will so far help, even if it be in but a small way, by extending the area under cultivation, particularly with wheat, maize, and potatoes. By adding to the quantity for export or by preventing the increase in price through the need for the importation of any crop or produce, a grower is giving more to the community generally than by a direct contribution to this or that fund.

## EXTENSION OF THE AREA UNDER WHEAT.

Whilst the dairying industry has been progressing in an almost phenomenal manner in Queensland of late years, the purely agricultural prospects and possibilities have been to some extent not properly realised. For instance, although very large areas of Queensland are eminently adapted to wheat culture, the State only produces about one-half of its requirements of this cereal, yet Queensland, in spite of the capriciousness of the seasons, has maintained her position among the States as producing a greater average to the area of all the States excepting Tasmania. In view of our dependence upon other States for wheat supplies, the Minister for Agriculture has decided upon a course of action with a view to inducing farmers to put in larger areas of wheat during the coming season, and to that end, to assist them, at this critical period of the wheat industry, to make Queensland at least for one year self-supporting insofar as regards this essential cereal. The following are the proposals of the Minister, and they are so very liberal that we shall be surprised if farmers who have sufficient suitable land not absolutely required for other purposes, such as lucerne-growing, do not avail themselves of the opportunity to utilise it for wheat-growing:—

### EXTENSION OF AREA UNDER WHEAT FOR SEASON OF 1915.

The Minister for Agriculture will receive applications from farmers, who, for the extension of the area under wheat during 1915, require financial assistance. Each application will be subject to inquiry and will be decided by the Minister upon the merits of the case.

Financial assistance will be given for the following purposes, and will be a first charge upon the crop, and is to be repaid by 31st December, 1915:—

1. For increasing the area under wheat, over and above the area planted upon a farm during 1914. Assistance in this respect will only be given where the land has been or can be cleared and ploughed by the 28th February, 1915.
2. For planting new land upon a farm which wheat has not before been grown.
3. For the supply of seed for planting.
4. To obtain implements for the cultivation of new land and for harvesting in cases where the farmer does not possess such implements.
5. For the hire of horses or motor power.
6. For the payment of portion of extra labour required.

All farmers who wish to make application should be particular in furnishing the information concerning the assistance required, so that there may be no delay in making the necessary inquiries.

Applications are to be addressed to, and must be received by, the Under Secretary, Department of Agriculture and Stock, Brisbane, not later than the 10th December, 1914.

ERNEST G. E. SCRIVEN,
Under Secretary.

Department of Agriculture and Stock,
Brisbane, 16th November, 1914.

# MARKET GARDENING.

## GROWING RHUBARB IN THE TROPICS.

By J. NEWMAN, Rockhampton.

Rhubarb can be grown in the tropical parts of Queensland as easily as in the more temperate districts, or Southern States.

The chief difference in its cultivation and treatment lies in the fact that it must here, in Central Queensland, be grown as an annual.

I have in one season grown 500 bundles of good marketable rhubarb on one and a-half chains of land, and anyone can do the same by observing the following hints on its cultivation from the sowing of the seed to maturity of the crops.

Sow in February, in boxes of rich soil, and as this is the wet season, and the young plants are liable to damp off with excessive heat and moisture, place the boxes under the shelter of a veranda and water when necessary.

Sow again in March, in the open ground, in beds richly prepared, and raised at least 6 in. above the surrounding land. Shelter from sun with dry boughs, and from excessive wet with boards.

It is now only necessary to say—treat them as you would cabbage plants, transplant when they are the size of cabbage plants, and plant them the same distance apart in permanent beds as you would cabbage plants, but do not plant with a dibble as their long tap roots (they often have three or four) might become twisted together in the hole. It is best to make a straight cut down with a trowel, and spread out the roots against side fanwise and then close in firmly.

It must be remembered that rhubarb, like all the Brassicas, is a gross feeder, perhaps even more so, and although botanically belonging to an entirely different class of plants, it requires the same liberal treatment—deeply trenched and heavily-manured land, a heavy surface mulch of manure, and an abundance of water.

Four months after sowing the stalks should be fit to pull. Take one from each plant at first, and never at any time leave less than three strong stalks, or the plant will suffer.

From May to November is the rhubarb season in tropical Queensland; after that the intense heat will kill them off. I have always grown my own seed by allowing selected stalks to flower, and I find it equal to that obtained in the South.

# Pastoral.

## SHRINKAGE OF WOOL WEIGHTS IN STORE.

This question has cropped up since the war began, and I have frequently been asked questions on this very important matter. I therefore think it well to put my views on it before the public through the "Queensland Agricultural Journal."

Prior to my appointment in the service of the State I was a scouring contractor, sheep and wool classer, handling from 4,000 to 5,000 bales of wool per annum.

At Coongoola Station, Cunnamulla, in 1894, I was asked to refund on an average of 8 lb. per bale in 2,100 bales of wool classed and scoured by me in 1893. This was the difference between the station weights and the London weights—shrinkage between Coongoola and England. For the first time, I believe, the wool had gone round by Torres Straits and the Red Sea in an iron steamer. I had never seen such a shrinkage before. The wool was properly weighed here by the station storekeeper on new scales, and these weights were checked in Brisbane, and I am sure that the London weights were correct.

For several years after 1894 I watched the weights carefully at each end, having access to the London weights when the account sales came forward. This, not only on Coongoola, but on other large stations whose wool I handled. I also made inquiries in other directions.

I mention the above to show that I speak with a certain experience, and can speak with authority.

The results of my observations and inquiries are as follows:—

It is known by exact experiment that wool, like sugar, salt, &c., has the power of absorbing moisture from the atmosphere. Professor Bowman, in his work, "The Structure of the Wool Fibre," p. 249, states:—"With regard to the water of hydration, this is an important matter commercially as well as chemically, because no one can afford to pay for water in place of wool, and it is well known that water is not infrequently added in order to increase weight. As the wool is obtained from the farmer, it differs very widely in different classes and seasons, as might be expected."

The author made a series of experiments with well-washed wool to endeavour to decide how much water was really associated with the fibre as water of hydration—that is to say, water which really belongs to the fibre in its natural condition—moisture which it will take up from the air when it is left exposed at ordinary temperatures. He found that after drying a number of samples of wool at 100 degrees Fahr., and then

exposing them to the air in an ordinary warehouse, unheated in any way, with a temperature of from 50 to 60 degrees Fahr., the following was the result:—

| | |
|---|---|
| Lincoln hogs .. .. .. .. | 7 per cent. gain |
| Lincoln wethers .. .. .. .. | 9 ,, ,, ,, |
| Leicester hogs .. .. .. .. | 6 ,, ,, ,, |
| Leicester wethers.. .. .. .. | 10 ,, ,, ,, |
| Irish hogs .. .. .. .. .. | 7 ,, ,, ,, |
| South down .. .. .. .. | 9 ,, ,, ,, |
| Skin wool .. .. .. .. .. | 10 ,, ,, ,, |

The average gain thus was 8·28 per cent.

A number of other experiments were carried out, to which I must refer those interested. This property of wool (hygroscopic) was recognised as far back as 1875, and at the International Congress held in Turin in that year, the standards of moisture were fixed for (amongst other textiles) worsted yarns at 18¼ per cent. Since then, conditioning houses have been established in every wool manufacturing centre in the world, and now, as Profesor Bowman states, " the following tables (p. 253) show the standard allowance of moisture adopted for cotton and other materials at these testing-houses. Taking wool alone—

TABLE OF WATER ALLOWANCE.

| | Manchester. | Bradford. |
|---|---|---|
| Worsted yarn .. .. | 18¼ per cent.; | 18¼ per cent. |
| Carded woollen yarn .. | 17 ,, ,, | 17 ,, ,, |
| Tops combed with oil .. | 19 ,, ,, | 19 ,, ,, |
| Tops combed without oil .. | 18¼ ,, ,, | 18¼ ,, ,, |
| Noils .. .. .. .. | 14 ,, ,, | 14 ,, ,, |
| Scoured wools .. .. | 16 ,, ,, | 16 ,, ,, |
| Shoddy yarns .. .. | 13 ,, ,, | 13 ,, ,, |

It has been found by a number of experiments conducted in these places that if wool be subjected to the highest temperature it can sustain without scorching, it will regain from 18 to 18½ per centum of moisture, and we may, therefore, regard this as its normal condition under the usual atmospheric conditions.

" Of course, this loss in washed wool would probably indicate a much larger one on the wool as it comes from the farmers' hands, but there is always difficulty in measuring it, because of the large quantity of grease, earthy matter, and other substances which are mechanically associated with the wool." Thus Professor Bowman.

Well, as sheep are shorn in Australia under climatic conditions varying from extremely dry to extremely wet, it follows that a hard-and-fast average of gain or loss in storage cannot be determined.

If seasonal conditions be dry when the wool is pressed on the station, and it has been properly dried from the scour, it is likely that there will be a gain in weight of the wool stored on the coast. This because the average humidity of the coastal areas is much greater than that of the Western country.

On the other hand, if the sheep be shorn in a wet season in the West, and the wool consequently carries a percentage of atmospheric moisture or water through not being properly dried from the scour, then there is a likelihood of considerable shrinkage in the store.

This shrinkage cannot be determined any more than can atmospheric conditions be determined months in advance by the meteorologists.

The conclusion of the matter then, is:—*First*—Hard-scoured and hard-dried wool from the West, in a dry season there, sent to the coast and stored for months where the average humidity is always greater, should gain in *weight of water not* in weight of wool. Wool itself cannot gain in weight. *Second*—Wool pressed under damp atmospheric conditions in the West, or imperfectly dried from the scour, will lose in the store, or at least, will not gain in weight. Wool itself cannot lose weight. *Third*—Without knowing exactly the conditions of humidity, amount of moisture left in wool in drying, and degree of humidity on the coast during the period between shearing and shipping abroad, it is impossible to give even an approximate estimate of loss or gain in wool weights for Western clips in store.

As a corollary to the above, it is certain that no machine will ever be invented to settle the " Wet Sheep " question in shearing sheds.

For instance: A flock of sheep is being shorn under dry conditions. Just before rain falls the shed is filled with sheep. Then the wool of these last, which has not been rained upon, will show a percentage of moisture greater than those shorn under the dry conditions. The wool has absorbed moisture in the same way as sugar or salt. Ask the wool-pressers when is the easier time to get the scheduled weight into the bales—before or after a wet spell?

The machine, whatever it may be, must show moisture in wool, in greater proportion after than before rain, even if the sheep had not been rained upon for weeks before the test.

# Dairying.

## THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF OCTOBER, 1914.

| Name of Cow. | Breed. | Date of Calving. | Total Milk. | Test. | Commercial Butter. | Remarks. |
|---|---|---|---|---|---|---|
| | | | Lb. | % | Lb. | |
| Nellie II. ... | Shorthorn... ... | 20 July, 1914 | 1,133 | 3·8 | 50·48 | |
| Rosebud ... | Ayrshire ... ... | 20 Sept. ,, | 1,069 | 3·3 | 41·20 | |
| Lark ... | ,, ... ... | 27 July ,, | 838 | 3·9 | 38·29 | |
| Madam Melba | Holstein ... ... | 8 Sept. ,, | 1,175 | 2·8 | 38·21 | |
| Miss Bell ... | Jersey ... ... | 25 Sept., 1913 | 583 | 5·0 | 34·39 | |
| Honeycombe | Shorthorn... ... | 23 Sept., 1914 | 9[illegible]6 | 3·1 | 33·42 | |
| Miss Edition | Jersey ... ... | 10 July ,, | 721 | 3·9 | 32·95 | |
| Countess of Brunswick | Shorthorn... ... | 26 July ,, | 746 | 3·6 | 31·40 | |
| Burton's Lady | ,, ... ... | 23 July ,, | 774 | 3·4 | 30·72 | |
| Sweet Meadows | Jersey ... ... | 28 July ,, | 538 | 4·6 | 29·18 | |
| Lady Margaret | Ayrshire ... ... | 19 June ,, | 685 | 3·6 | 28·84 | |
| Silver Nell... | Shorthorn ... | 5 Oct. ,, | 705 | 3·5 | 28·83 | |
| Auntie ... | Ayrshire ... ... | 26 June ,, | 680 | 3·6 | 28·63 | |
| Lady Melba | Holstein ... ... | 6 Mar. ,, | 698 | 3·5 | 28·54 | |
| Lady Dorset | Ayrshire ... ... | 20 Sept. ,, | 719 | 3·3 | 27·64 | |
| Lady Athol | Shorthorn ... | 10 July ,, | 613 | 3·6 | 25·80 | |
| Davidina ... | Ayrshire ... ... | 17 July ,, | 726 | 2·9 | 24·46 | |
| Bluebelle ... | Jersey ... ... | 27 Mar. ,, | 612 | 3·4 | 24·29 | |
| Lowla II. .. | Shorth'rn-Ayrshire | 23 Sept. ,, | 728 | 2·8 | 23·66 | |
| Sylvia II. ... | Shorthorn ... | 21 Sept. ,, | 699 | 2·9 | 23·55 | |
| Lady Lil ... | Jersey ... ... | 22 Aug. ,, | 611 | 3·3 | 23·52 | |
| Lennie ... | Ayrshire ... ... | 15 Aug. ,, | 552 | 3·6 | 23·23 | |
| Lucinda ... | ,, ... ... | 20 Sept. ,, | 672 | 2·9 | 23·64 | |
| Cocoatina ... | Jersey ... ... | 20 April ,, | 387 | 4·9 | 22·36 | |
| Gretchen ... | Holstein ... ... | 6 May ,, | 589 | 3·2 | 21·96 | |
| Lady Maid... | Shorthorn... ... | 17 Mar. ,, | 427 | 4·3 | 21·60 | |
| Lady Lark... | Ayrshire ... ... | 23 Sept. ,, | 442 | 4·0 | 20·72 | |

Ration fed: 20 lb. of sorghum ensilage and 2 lb. of bran per cow.

# Poultry.

## REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, OCTOBER, 1914.

Five thousand eight hundred and seventy-nine eggs were laid during the month (up to evening of 30th), an average of 147 per pen. The Derrylin Poultry Farm White Leghorns win the monthly prize with 163 eggs. The following are the individual records:—

| Competitors. | Breed. | Oct. | Total. |
|---|---|---|---|
| T. Fanning | White Leghorns | 142 | 896 |
| A. T. Coomber | Do. | 158 | 891 |
| Kelvin Poultry Farm | Do. | 131 | 842 |
| Moritz Bros., S.A. | Do. | 152 | 829 |
| Loloma Poultry Farm, N.S.W. | Do. | 157 | 826 |
| Loloma Poultry Farm, N.S.W. | Rhode Island Reds | 156 | 820 |
| R. Burns | Black Orpingtons (No. 1) | 146 | 801 |
| Geo. Tomlinson | White Leghorns | 158 | 798 |
| Cowan Bros., N.S.W. | Do. | 159 | 788 |
| J. T. Coates | Black Orpingtons | 135 | 768 |
| E. Le Breton | White Leghorns | 161 | 765 |
| R. Burns | S. L. Wyandottes | 148 | 763 |
| A. F. Camkin, N.S.W. | White Leghorns | 153 | 751 |
| A. H. Padman, S.A. | Do. | 159 | 743 |
| R. Burns | Black Orpingtons (No 2) | 147 | 743 |
| Mrs. Bieber | Brown Leghorns | 152 | 742 |
| J. R. Wilson | Do. | 126 | 739 |
| Mrs. Munro | White Leghorns | 160 | 728 |
| T. Fanning | Black Orpingtons | 150 | 727 |
| Marville Poultry Farm, Victoria | White Leghorns | 160 | 723 |
| E. V. Bennett, S.A. | Do. | 147 | 720 |
| R. Jobling, N.S.W. | Do. | 138 | 718 |
| J. Franklin | Do. | 147 | 718 |
| Derrylin Poultry Farm | Do. | 163 | 718 |
| J. Gosley | Do. | 132 | 716 |
| J. T. Coates | Do. | 147 | 714 |
| Geo. Austin | Do. | 138 | 711 |
| F. McCauley | Do. | 154 | 707 |
| J. D. Nicholson, N.S.W. | Do. | 135 | 699 |
| J. Manson | Do. (No. 1) | 140 | 699 |
| J. Kilroe | Do. (No. 2) | 145 | 681 |
| Mrs. Bradburne, N.S.W. | Do. | 151 | 671 |
| Range Poultry Farm | Do. | 148 | 670 |
| Douglas Moreton, N.S.W. | Do. | 138 | 667 |
| J. Kilroe | Do. (No. 1) | 121 | 664 |
| J. Zahl | Do. | 143 | 654 |
| C. M. Jones | Do. | 147 | 640 |
| J. N. Waugh, N.S.W. | Do. | 139 | 634 |
| J. Murchie | Brown Leghorns | 149 | 613 |
| J. M. Manson | White Leghorns (No. 2) | 140 | 607 |
| Total | ... | 5,879 | 23,904 |

In regard to the 1915-16 competition, we desire to state that, in spite of the fact that the number of pens is to be increased to 52, the whole of the accommodation has been allotted, and no further entries can be received.

## A SIMPLE METHOD OF PRESERVING EGGS.

At this time of the year many poultry-keepers would benefit by saving eggs for the Christmas demand. There are two methods of accomplishing this, both of them cheap and effective. One is the limewater solution, the other the water-glass solution.

For the first, 16 oz. of quicklime are thoroughly slaked in 1 gallon of cold, previously boiled, water. This is to be well stirred, allowed to settle, and the clear solution drawn off. Place the eggs in a clean kerosene tin (preferably an earthenware jar). Pour the clear limewater over them, and allow the upper layer of eggs to be 3 in. below the surface. Close the vessel tightly and place in a cool, dark pantry or cellar. Water-glass is silicate of sodium, a thick liquid, almost transparent, colourless, and devoid of any odour. For use, every quart of water-glass should be thoroughly mixed with 9 quarts of boiling water. As soon as it is cold it is ready for use. Pour the solution over the eggs in the same way as in the limewater method. Cover tightly, and keep in a cool place. When the eggs are to be removed, draw off the solution and wash them.

Now we come to a still more simple and inexpensive but equally effective method of egg-preservation. The main object of preservatives is to prevent the air from penetrating to the inside of the egg. But this alone will not entirely avert putrefaction because the elements of putridity already exist in the pores of the shell. Consequently, to obtain a perfect preservation, it is necessary not only to prevent the atmospheric air from entering the egg but to retain the life-power of the organisms in it.

The eggs to be preserved by the following process must first be carefully examined to see if any are cracked or split. Such eggs must be rejected. Then the eggs are placed in a bath of lukewarm water (95 degrees Fahr.), in which they must remain for 15 minutes. When taken out they must be well rubbed with a soft rag to remove all dirt particles from the shell. When they are clean, they are placed in a sieve and plunged for exactly 4 to 5 seconds in boiling water, and at the expiration of that time they are to be taken out and cooled off in cold water and laid on a cloth to dry in the air. Care must now be taken that they are not rubbed by the cloth. As soon as dry, they must be placed in boxes, and packed in chaff, chopped straw, oakum, or suchlike material and put away in a dry, cool place. The packing material must be perfectly dry. By the immersion in boiling water for 5 seconds, the fungi and bacteria in the egg are all destroyed. At the same time, owing to the high temperature, a coagulation of the inner tissue which unites the shell to the skin of the egg takes place, by which the pores of the shell are closed, thus preventing any further infection. The main difficulty of the operations lies in the exact duration of the 5 seconds during which time the eggs are plunged into the boiling water and the care required to see that the packing material is absolutely dry. If the eggs are kept in longer than 5 seconds, it results that, especially in thin-shelled eggs, a portion of the albumen under the skin coagulates, and that no destruction of the fungus germ takes place. Hence the whole result depends entirely upon the immersion of the eggs from 3 to 5 seconds—preferably 4 seconds—in the boiling water. This method, owing to its simplicity and cheapness, is adapted not only to the householder or farmer but also for those dealing largely with eggs in their business. Eggs preserved in this manner have been proved to be perfectly fresh and good, and could not be distinguished either in taste or smell from fresh-laid eggs.

# State Farms.

## NOTES FROM KAMERUNGA STATE NURSERY FOR SEPTEMBER, 1914.

Rainfall for the month, 3·44 in.; number of days on which rain fell, 12; maximum solar thermometer on the 22nd, 153°; minimum terrestrial thermometer on the 2nd instant, 51°. It is now some years since such good rains have fallen during the month of September, and being spread over some days the ground was given a chance of getting nicely wet through without any water running away. Rows of various cereals and cowpeas planted in August are now looking up; on the other hand, weeds which are generally easy to keep in check at this time are growing fast.

The Nursery exhibit was taken to the Ingham Show during the month, and caused a good deal of interest.

*Vanilla.*—The first few flowers are just beginning to open, and hand-pollinating has started.

*Algaroba.*—Owing to notices and accounts of this tree which have appeared from time to time, applications for seeds have been coming to this nursery, I would therefore like to point out that although this tree grew, and fruited here many years ago, we have none here at present, as it was destroyed by a cyclone, and although others have been planted they have not so far been successful. Some months ago I obtained a little seed from California, but this has been distributed.

## WARREN.

The Manager, Mr. Thos. Jones, in his report of the work, &c., on the farm for November, gives particulars of the experimental plots planted, of maize, sorghum, millets, buckwheat, sunflower, gram, Soja beans, Horse-bean, field-pea, all of which are looking well, thanks to good cultivation and a few showers of rain during the month. Lucerne, owing to the effects of strong drying winds, only gave a small cutting. New land is being cleared in the hope of having an extended area under maize this year. All cleared land is also being prepared for the same purpose. The manager wishes to remind readers of the Journal that the stallion-fee has been reduced this year to £2 2s. per mare. All stock is in splendid order and condition. The district as a whole is in need of rain. Referring to the planting of larger areas of maize, he has spoken to several farmers on the subject, and has been assured that, given a good rainfall, they will probably plant a larger area this year.

# Horticulture.

## IMPORTANT TO SHOW COMMITTEES.

The Rev. W. Wilks, writing to the "Royal Horticultural Society Journal," draws attention to a paper read in 1911 on

"DIFFICULTIES IN FLOWER SHOW SCHEDULES,"

in which he pointed out errors of frequent occurrence and their remedy. He says:—

"That this paper met a need and has been of some assistance to horticultural societies is, I think, proved by the fact that whereas formerly I used always to have a very heavy correspondence, during the months of July and August especially, relating to disputes on points of disagreement in schedules, I now receive such letters comparatively rarely. During the last two years I have collected a few further errors which have occurred and to which I think it worth while to call attention of other societies.

"1. *A dish of fruit—four varieties.*

"An exhibitor staged two varieties of apples, one of tomatoes, and one of pears.

"It was contended that four varieties of *one kind* of fruit were meant, but the schedule did not say so. Any four varieties of fruit, either of the same or of different kinds, were probably eligible.

"I say 'probably,' for it is doubtful whether such an exhibit should not be disqualified, as it would consist of four dishes of fruit, and the schedule only asks for 'a' dish—*i.e.*, one dish containing four varieties.

"1A. Another example of the same error was as follows:—

*Fruit—Collection of six varieties; white and black grapes allowed.*

An exhibit of one bunch each of black and white grapes, one dish of figs, one of peaches, one of nectarine ('Pine Apple'), and one of nectarine ('Humboldt') was disputed on the ground that only one nectarine variety was eligible. As a matter of fact, four or even six varieties of nectarines would not have disqualified the exhibit. *Varieties* were asked for. The schedule should have asked for six kinds.

"2. *Six stems of different varieties of Sweet Peas.*

"The exhibitors were, one and all, staging one stem each of six varieties. To do so was quite within the wording of the schedule; or they might have staged six stems of each of an unlimited number of different varieties, without disqualification. What the Show Committee really intended to ask for was 'six vases of different varieties of Sweet Peas, six stems in a vase.'

"3. *The best collection of Hardy Flowers. No duplicate bunches or mixed bunches allowed.*

"The question arose—Were *Phlox decussata*, vars. 'Tapis blanc,' 'Etna,' and 'Sheriff Ivory' to be considered as 'duplicate bunches?'

"No, certainly not. The schedule did not specify one variety of each kind, and different varieties of one kind cannot be considered duplicates of each other.

"4. *Nine Hardy and Half-hardy Annuals—dissimilar.*

"A dispute arose because one exhibit contained two annual chrysanthemums of different colours.

"The term 'dissimilar' is one which should have no place in horticulture, and it is not recognised by the Royal Horticultural Society. To put the case thus: Two men are walking along the road—one wears a green hat and the other a brown. Are they similar or dissimilar? As men they are similar, and different hats cannot make them otherwise; but as specimens of colour or varieties of clothing they are dissimilar.

"The word is a very bad one to use, and will give endless trouble in a schedule. 'Distinct kinds' or 'distinct varieties' restrict to narrow limits the latitude for misunderstanding.

"5. *A class for Sweet Peas 'shown with own foliage.'*

"It was contended that the foliage meant was that actually belonging to the individual plant from which the flowers themselves were gathered.

"This is not the interpretation for flower-show purposes. So long as the foliage is that of the Sweet Pea (*Lathyrus odoratus*), and not of any other *Lathyrus* or *Pisum,* the intention of the schedule is met."—"Royal Horticultural Society Journal."

## ADVICE TO THE FARM DYNAMITER.

Mr. J. F. Keane, of Carbeen, writes:—

Among all that appeared in the Journal concerning dynamite on the farm, one piece of knowledge I have always found of great value, so far as I saw, escaped mention.

The ordinary miner's hammer and drill is the best set of tools with which to sink shot-holes in any earth at any angle. I have always used a 2 ft. 6 in. length of 1¼-in. octagonal steel and a 4-lb. hammer, the drill done up or sharpened as for rock.

Anyone, not a miner, beginning with the tools may be given a little instruction, such as the following:—

Clean off turf or rubbish down to the firm earth at the spot you intend to enter the drill. Lift the drill an inch or two and turn it about a quadrant after every blow of the hammer. In loose soil do not strike too hard for the first 6 in., as the drill may have a tendency to bog. After the first foot of its descent the drill cannot be struck too hard in the softest loam. For any greater depth than 2 ft. 6 in. it is advisable to use a 6-ft. length of steel and "jump" the rest of your hole down. No scraper to withdraw "drilling" is required in alluvia as the displaced earth imbeds in the surroundings. Stones are either turned aside or shattered, giving no trouble. If a root is encountered, pull out and start another hole; the drill goes down so quickly the time lost is immaterial. I always stump and split with powder, but that is only because I am used to it. Had I started with dynamite and been at it for more than thirty years, I have no doubt I should prefer it. Smaller drill, lighter hammer, quicker work, and, as experience was gained, probably much better work.

# Vegetable Pathology.

## SMUT DISEASE IN MAIZE.

A preliminary and exhaustive report on the occurrence of a maize disease in certain parts of the Toowoomba district was made to the Department of Agriculture in February, 1895, by Mr. H. Tryon, Government Entomologist and Vegetable Pathologist. The disease was known as "Smut of Indian Corn," and was of the variety caused by the invasion of a parasitic fungus named *Ustilago maydis.* The advice given then was acted upon, and since then the disease has never been a subject of complaint (*vide* Mr. Tryon's letter of 29th June, 1914) until the matter was brought to the Department's notice by Mr. A. Reid, Kingaroy, Coolabunia, on 12th June, 1914. On the 12th October, 1914, Mr. Reid sent to the Department a box full of fungus-smut, and Mr. Tryon wrote, on the 24th, on the subject as follows:—

"The disease on the evidence of this material, then, is doubtless the maize-smut that I have earlier written about, under the term *Ustilage maydis Corda*, and which was investigated by this Office in February, 1896.

"In its case the originating cause has doubtless been some of the fine black material that constitutes the smut whence the affection derives its name, and that derived from an instance of the malady elsewhere has been conveyed to the Coolabunia district in seed or has been transported thereto by the wind from a maize-field smitten with it outside, for there are good grounds for concluding that this variety of smut is a speciality of the plant whereupon it occurs. Without entering into the technicalities regarding the connection between the smut-fungus and its host plant, that results in the enormous growth filled with black powder that is its predominant symptom; it may, however, be pointed out that this powder, who appearance suggests the term 'smut,' is really composed of enormous numbers of particles, each of which is a seed. Now, these seeds have certain peculiarities that should claim the attention of the farmer. In the first place, they are very small, and so may be transported through the air as dust is borne along. 2. They are rough exteriorly, and so adhere to objects they may have come in contact with. 3. They have a very persistent vitality, enduring alive for years should circumstances favourable to their growth not be encountered; indeed, it is a fact that it is with difficulty that they can be made to germinate at all when fresh, even in water. 4. Further, they can pass through the system of an animal without being injured; but, on the other hand, rather invigorated, for after this has happened they germinate more readily; thus, when land has received stable manure derived in part from animals that have fed on maize-smut-tainted material, this will become infective to healthy

maize grown thereon. Finally, it may be added that the smut-seed (smut) does not immediately establish its connection with the maize when it germinates, but the germ-sprout first produces smaller seeds, the secondary spores or conidia, and that these seeds that grow and multiply in the soil after the manner of yeast are actually the bodies that, gaining access to the plant, cause it to be smut-smitten. For—as it must be added —the maize acquires the disease when it is only a diminutive seedling, the delicate parts within the earth being first assailed, although really it cannot be recognised that such has happened.

"It follows from these considerations that in coping with this serious enemy of maize that—

"1. Little or no benefit will accrue from 'treating' the seed contrary to what happens in the case of other smut diseases, except the farmer has no maize-smut on his land or in his neighbourhood and is procuring seed from some questionable and remote source. In the latter case he might advantageously pickle it as he would do wheat, say, in order to kill any adherent spores or seeds.

"2. If he has the disease on his land he should cut out and destroy all affected maize-stalks. He should do this carefully and thoroughly, since one smutted cob or tassel will mean billions of billions of seeds of the disease. For the same reason he should perform the work on the very earliest opportunity whilst the smut-tumour is still intact and no spores of smut have as yet escaped. The disease-affected maize so removed he should burn or deeply bury, and not feed it to stock or even use it as bedding for stock.

"3. If, under any circumstances, this action has been postponed, and the time for harvesting the crop has arrived, he should first gather the latter in, meanwhile leaving the affected stalks standing in the field These he should then deal with by burning.

"4. In land on which 'smut' has shown itself he should not plant maize in succession to maize, but alternate the ground with other crops, even for a season or two, before setting it with corn again.

"5. If he has smut-affected maize and he is, under any circumstances, induced to grow a further crop of this plant on new land, he should avoid such as is situated immediately to the leeward of the crop already smut-affected or in the line of the prevailing winds, since the soil of this is almost certain to have received a full charge of smut and will, if so, be in a condition to communicate a fresh outbreak of the trouble, so with land situated in the direction of the drainage flow from disease-affected field. These simple measures will assist very materially in helping the farmer to subdue the disease, and, if neglected, may lead to its becoming more and more prevalent. No application to the seed or plant in any stage of its growth, if a smut-spore-laden soil is selected for the growing crop, will be of any avail. It should have been added also, of course, that smut-contaminated stable manure or pen manure should under no circumstances be put on land destined at any time for maize cultivation."

# Entomology.

## CANE GRUB AND MUSCARDINE FUNGUS AT CAIRNS.

BY H. TRYON, Government Entomologist and Vegetable Pathologist.

With reference to the introduction of the Green Muscardine fungus from Samoa, in view of its possible use in cane grub destruction, I may state that this organism already occurred in the Cairns district in association with the insects in question when last I was pursuing my inquiries there; and, since it is indigenous to Queensland, has probably always done so. It is, however, local in its distribution there—a feature consistent with its nature and habits.

The Muscardine fungus is named *Metarrhizium anisopliæ* (Metschnikoff),* Sorokin, and for some years past has engaged our attention. Thus, as early as 1893, the following pronouncement was made:—

" There are a host of insects which, by their depredations, largely militate against the success of other enterprises, especially the ones connected with agriculture, and it would be largely to the interest of those concerned with these pursuits if these fungi might be made available in combating with insect-pests. Thus, the celebrated Russian scientist, Metschnikoff, having become aware that the fungus *Isaria destructor* (one of the names under which he had described the above organism and its habits) preyed upon the White Grub of the scarabæid beetle—*Anisoplia austriaca,* which, in the south of Russia, ravaged the wheatfields, and knowing that it could be transferred from grub to grub, conceived the idea of cultivating this fungus apart from its host in some artificial medium, and so arming himself with a powerful instrument for contending with this destructive beetle in the many regions where the Isaria fungus did not already occur. This savant, then, aided by Cienkowsky, as early as 1879, accomplished the result at which he had aimed, empolying as a nutrient medium a fluid composed of the fermented juice of the maize. A correspondent, Professor Alfred Giard, charge d'cours in connection with the faculty of science at the Sorbonne, to whom I am indebted for much of the information contained in this paper, . . . . . was subsequently successful with *Isara densa,* which lives on the ' Ver Blanc ' (White Grub), another destructive scarabæid larva (of France) ; and this fungus, which was found to be capable of being artificially cultivated, was also discovered to be available for the direct infestation of no less than twenty-four different kinds of other insects." (Tryon, H.: " Insects as Fungus Hosts," 20th July, 1893; " Transactions, Natiural History Society of Queensland "; and " Queenslander," August, 1893.)

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* ***Metarrhizium anisopliæ*** **(Metschn.) Sorokin, according to J. B. Rorer, is identical with *Entomophthora anisopliæ*, Metschn.; *Isaria* destructor, Metschn.; *Cospora* destructor, Delacroix; *Penicillium anisopliæ*, Vuillemin; and *Septocylia drium suspectum*, n. sp., of Kew.**

In this paper it was further pointed out that the *Isaria* was merely a form of a second fungus named *Cordyceps,* found associated with scarabæid grubs and other insects, and their respective characters were assigned; and a scarabæid larva attacked by the latter, and of Queensland origin, was referred to as being " One of the redoubtable ' White Grubs ' which sugar-planters know so well," and as being on exhibition.

In 1896, in writing regarding the " Grub Pest of Sugar Cane " (*Lepidiota squamulata* = *L. albohirta*), it was remarked that " the natural enemies calculated to exert the greatest influence in holding the grub pest in check are undoubtedly the plant (*i.e.*, fungus) parasites " (p. 35).

I also referred to the discovery at Goondi, Johnstone River, by Mr. Freeman, an officer of the Colonial Sugar Refining Company, of grubs of *Lepidiota albohirta* " infested with a parasite belonging to the genus *Cordyceps,* the alternate form of the Muscardine fungus," and further remarked: " To utilise, however, the discovery of the existence in Queensland of a *Cordyceps* preying upon the insect under consideration for practical ends, it is necessary in the first instance to discover the conidial condition (*Isaria*) of that organism; under which state alone it is available for use as a source of communicating the disease associated with its presence. This has not yet been done." (Tryon, H.: " Grub Pest of Sugar-cane," July, 1893, Department of Agriculture, Queensland, Brisbane, 1896.)

In 190 , whilst on a visit to the Mulgrave district, I discovered two or three examples of the larvæ of the Cane Beetle that occurred on Mr. Blackwell's farm, at a depth of 1 ft. 6 in. from the surface, dead, and covered with the Green Muscardine fungus.

Next it happened that dead cane-beetle grubs, exhibiting the Cordyceps phase of the fungus, were encountered in the Highleigh Estate, Mulgrave River, and that experiments were undertaken at the Mulgrave Central Mill by its chemist, Mr. L. Nott, to utilise (if possible) this discovery, but with negative results.

Again, when in the Cairns district in June-July, 1908, prosecuting similar inquiries regarding the " Grub Pest of Sugar Cane " (*Lepidiota albohirta*), I not only repeated this discovery by finding a large number of grubs, dead and exhibiting both the *Cordyceps* and *Isaria* (Metarrhizium) stages of the fungus, but I initiated experiments both in the field and laboratory, having its propagation and utilisation in view.

This latter discovery was made on the farm of one of the canegrowers connected with the Hambledon Mill, and was only realised after arduous field labour, the soil to the depth of 2 ft. having to be lifted and carefully examined throughout an area of several square yards.

Reference is made to this work in the " Annual Report of the Entomologist and Vegetable Pathologist " for 1908-9, in the following words:—

" On this occasion allusion need only be made (1) to the discovery of a special disease-producing fungus—a species of *Isaria* (Metarrhizium)

locally destructive to the grubs which, as the outcome of investigations conducted at Hambledon (by courtesy of the Colonial Sugar Refining Company, Limited), and that, unfortunately, had to be suspended almost as soon as entered upon, it was found possible, under laboratory conditions, to utilise in conveying fatality from grub to grub." (*Op. cit.*, p. 118.)

## UTILISATION.

In 1896, the writer pointed out that, even after the discovery of the *Isaria* or *Metarrhizium* phase of the grub-destroying fungus above alluded to, and that is known under Robinet's name, " Muscardine," there would be considerable technical difficulties in using it in subduing the Cane Beetles. " When this (*i.e.*, the discovery) has been made known it may be added," to quote the words of S. A. Forbes of Illinois, in reference to this subject, " the whole matter is (still) involved in difficulties such as make absolutely necessary the strictest methods of experimental science " (" Grub Pest of Sugar Cane," p. 37).

Fortunately, since this was written, we have several important methods devised and made known for using " Muscardine " in the destruction of insects for our guidance.

(1) Metschinikoff's method alluded to herein as being made known by the present writer in 1893, has been followed by (2) methods devised in Honolulu in using the Muscardine fungus, imported from Japan by Albert Koebele in contending with the ground-frequenting grubs of the introduced bêetle, *Adoretus umbrosus.* (col. Scarabæidæ); by (3) that devised by J. B. Rorer, in utilising it in coping with the Sugar-cane Froghopper insect (*Tomaspis* spp. *Cercopidæ*), in Jamaica; and that by (4) Dr. K. Friedericks in contending with the Rhinoceros Beetle of the Cocoanut (*Oryctes rhinoceros, L.*) in Samoa. These methods of procedure having been described, accounts of them are fortunately available for reference.

In the Cairns investigations alluded to, and when this information was not yet available, it was proposed to first cultivate this fungus on the grubs themselves, and then infect soil rich in organic matter with the organism, and thus use this soil as an indirect medium for propagating the disease in the field, distributing it by special means for this purpose. With this object in view, then, both a (1) field experiment and a (2) laboratory one were inaugurated.

In the field experiment healthy and Muscardine-infested grubs were intermixed at the bottom of a rectangular excavation, so that they might come in contact one with another, and then covered with scrub soil rich in humus to a depth of 18 in. By this crude method, based on the observation that the disease-affected grubs occurred in well-defined

areas in the canefields where they were discovered, it was expected that spore-laden soil would be obtainable.

In the laboratory experiment, it having been observed that the spores formed by the *Metarrhizium* fungus, although very numerous, were also very small, falling into the interstices of the surface of paper when placed upon it, and were with difficulty only moistened, resting in masses on the surface of water, a soil both extremely fine and also unusually rich in organic matter was employed. This had been discovered under peculiar circumstances by the writer, at Bahana Creek, and conveyed some miles to the laboratory for the purpose. In this soil, when dry, it was found practicable to mix the spores, so as to have a relative large quantity of infective material available, and it was noted that it served to originate the disease in Cane-grubs confined in vessels containing it—as was found at the expiration of nearly six months, when on revisiting the district the results of a few of the laboratory experiments could still be appraised. It is conceived that it would be quite possible to produce this material in large quantities and distribute it in the drills whilst planting.

As pointed out by me, in my report on the "Grub Pest in the Mackay District," in 1896, and in lectures on the subject since, and notably in the one delivered at Nelson-Cairns, in June, 1908, there are grounds for concluding—with but little doubt—that the fungus enemy of Cane Beetle Grubs has, in the past, had considerable influence in locally controlling the numbers and destructiveness of these marauders of our principal tropical agricultural industry, and that it will continue to do so. It appears within the possibilities of scientifically devised methods to assist nature by distributing to a larger extent than is spontaneously realised this destructive agent through which it works.

In conclusion, with regard to the incident that has prompted these remarks, it may be added that the Samoan fungus (*Metarrhizium anisopliæ*) of the Rhinoceros Beetle and its habits and employment are described by Dr. K. Friederichs in the "Tropenpflanzer, Zeitschrift fur Tropische Landwirtschaft" for December, 1913, in the concluding portion of his article "Uber den gegenwartigen Stand der Bekämpfung des Nashornkäfers (*Oryctes rhinoceros, L.*) in Samoa." A translation can be made available for reference.

# Chemistry.

## WATER FOR IRRIGATION AND STOCK.

BY J. C. BRÜNNICH, Agricultural Chemist.

Every now and then reports are received from the country according to which crops have failed, soils have become unworkable and sterile, on using certain waters for irrigation, and again heavy mortality among stock has been caused by being forced to drink brackish water.

Analysis in such cases always demonstrates that the water was unfit for the use it was put to.

Numerous **analyses of waters** are carried out every year in our Agricultural Laboratory and many samples have to be condemned, and it is therefore of the greatest importance that pastoralists and farmers should make use of the Department's services in all doubtful cases.

As it is quite impossible to give with each analysis full explanations of the terms used, and more particularly the reasons why certain waters are not suitable, and why it is practically impossible to improve or purify such waters by simple means, it will be of general interest to give here a few **notes** on **water in general,** and on the conditions under which **waters** are **suitable for irrigation,** or **watering of stock** in particular.

**Water** is one of the simplest chemical compounds, and consists of a combination of the two gases Oxygen and Hydrogen. It is very widely distributed, and nearly four-fifths of the surface of our earth is covered with water, to an average depth of about 12,000 ft.

**Water** is one of the most wonderful gifts of nature, and has been recognised as such since time immemorial. Life could not exist without it, as it enters largely in the composition of all living matter. Animal bodies contain from 40 to 70 per cent. of water, and plants even up to 90 per cent.

**Chemically pure water** is difficult to prepare, and is a perfectly tasteless and odourless liquid. Even **distilled water,** unless prepared with special precautions, will contain small amounts of impurities.

Water is a great **solvent,** and this property to readily dissolve gases, liquids, and solids is of great importance in the household of nature. Water left exposed to the air absorbs gases from the atmosphere, and **rain water** will therefore contain about 4 cubic inches of nitrogen, 2 cubic inches of oxygen, and 1 cubic inch of carbonic acid gas per gallon. If we compare these amounts with the composition of the atmosphere, it will be found that the ratio of composition has been completely changed, as in the atmospheric air we find 4 volumes of

nitrogen to 1 volume of oxygen, and only small traces of carbonic acid. This fact that the air dissolved in water is much richer in oxygen is of the greatest importance to the life of aquatic animals. The increased amount of carbonic acid increases its solvent action on soils and rocks.

**Rain** as it falls, not only dissolves gases, but collects other impurities, as dust, bacteria, and also small traces of salt, ammonia salts, and other nitrogenous compounds.

Next to rain water the water from melting snow and ice, as found in mountain streams and lakes, and having passed only over hard crystalline rocks, is the purest water. As soon as rain water, or other water, passes through the soil, or layers of more soluble rocks, many mineral matters are dissolved, and change the character and taste of the water, which reappears again in form of springs, or is found in wells and bores. The water originally **fresh water,** containing only small amounts of mineral salts in solution, may have changed into a **mineral water,** containing large amounts of mineral matter.

Of such **mineral substances dissolved** the most important are:—

**Lime salts,** as calcium carbonate (*chalk or marble*) and calcium sulphate (*gypsum or copi*).

**Magnesium salts,** as magnesium carbonate (*common magnesia*), magnesium sulphate (*Epsom salt or salts*), and magnesium chloride.

**Sodium salts,** as sodium chloride (*common salt*), sodium sulphate (*Glauber's salt*), and sodium carbonate (*washing soda*).

The behaviour of water when using it washing with soap gives a fair indication of the amounts of mineral substances dissolved. Comparatively pure water, like rain water, readily produces a lather with soap, and is therefore called **soft water.** On the other hand, water containing lime and magnesium salts in solution, as frequently found in springs, wells, &c., are **hard waters,** and when rubbed with soap appear to produce a curdy or flaky precipitate, and only after considerable time a lather can be obtained. This action is a purely chemical one, caused by the mineral salts in the water decomposing the soap.

As a rule, a water of medium hardness, containing mineral salts and gases in solution, is more palatable and better for drinking **purposes** than a very soft water. For household purposes and factory use soft waters are generally to be preferred, as hard waters, besides leading to great waste of soap, on boiling and evaporation give cause to formation of boiler-scale; and some have a corroding action on metals.

One of the most pronounced mineral waters of nature is **sea water,** which contains about 3½ per cent. of solid matter in solution, three-fourths of which is common salt, or expressed in terms more generally used, sea water contains about 2,500 grains of total solids per gallon, of which 1,890 grains are sodium chloride or salt.

Water fit for drinking can be obtained from sea water by a process of distillation, as practised frequently at sea.

**Salt,** used in excessive amounts, acts like a poison, and therefore animals could not drink strongly **saline** or **brackish water** for any length of time.

Many of our well waters, and waters from shallow bores are saline, but fortunately the **water from artesian bores** are comparatively free from salt. Among about 180 analyses of bore waters, recorded in Dunstan's "Queensland Mineral Index," only ten contained more than 100 grains of salt per gallon, and only six of these more than 300 grains.

The **toleration** of various domestic animals for **salt** has not been accurately determined, and will depend naturally on many circumstances.

We have records that water containing from **600 to 700 grains of salt per gallon caused heavy mortality** among sheep, after using such water for a few months.

Water containing up to **300 grains of salt** per gallon may apparently be **used safely**, although many animals will refuse to drink the water with even this amount. Should water contain from 300 to 600 grains of salt per gallon it should be used for watering stock, in case of absolute necessity, for short periods. Water with still higher amounts is absolutely unfit for stock.

With regard to the **alkali carbonates,** chiefly soda carbonate, very little is known of its effect on animals, and in the quantities usually found in artesian bore waters no harm appears to be done. Among 180 samples of bore water, already referred to, 109 contained up to 20 grains of sodium carbonate per gallon, the remainder containing more than 20 grains.

The maximum amount of salt recorded is 1,200 grains per gallon, and the maximum amount of sodium carbonate 576 grains per gallon.

The fact of our artesian bore waters being more or less alkaline is of greatest importance when such waters are intended to be used for **irrigation,** as **alkali carbonates** (sometimes called "**Black alkali**") have a very bad action on soil and destroy plant life at certain concentration. Such alkali acts on the humus and the clay in the soil, and often renders it unfit for cultivation, by making it puddle in wet weather, and causing it to dry up into hard cement-like masses after dry spells.

The amount of **alkali carbonate** to be **tolerated** in **irrigation water** depends largely on the quality of the soil, methods of cultivation, and frequency of the use of water.

Professor Hilgard reports a case from California, where orange trees were killed within three years, by irrigating them with a water containing 21 grains sodium carbonate and 63 grains salt per gallon.

At the Moree Experiment Farm, in New South Wales, opened in 1899 and closed in 1910, bore water containing about 45 grains total solids, of which 34 grains sodium carbonate, per gallon, was used, and even after eight years' continual use excellent crops of oaten hay, wheat, sorghum, and maize were grown. In this case the soil, a heavy black loam, contained about 1½ per cent. of lime. On lighter classes of soil the effect of irrigating with such alkaline water might not have been so successful.

No hard-and-fast rule can be laid down to judge the **suitability of water** for **irrigation,** but it may be accepted that a brackish or saline water containing about **100 grains total solids,** chiefly consisting of **sodium chloride,** per gallon, is the limit for safe use under favourable conditions. The maximum amount of **soda carbonate** can be taken between **15 and 30 grains per gallon,** according to the nature of the soil to be irrigated and amounts of water to be used.

The injurious action of soda or black alkali may be counteracted to a large extent by heavy applications of **gypsum** to the soil.

The neutralisation of the alkali in the water with strong **nitric acid** has also been advocated, but will on account of expense be never of practical value. On a small scale, to grow a few flowers and vegetables with alkaline bore water irrigation, no other water being available, this treatment of water with nitric acid has proved successful in a few places. But even this treatment has its limits, as continual applications of water containing nitrates (saltpetre), although a great fertiliser, will similarly act on the soil as the alkali carbonate.

In all cases where alkaline bore waters are used for irrigation, the effects on soil and crops should be carefully watched, and the water should never be applied in excessive amounts. The ill-effects of mineral waters on plant life are chiefly due to concentration of the solutions in the soil, and even from waters containing only small amounts of mineral salts, dangerously high quantities may be left in the soil after repeated irrigation in hot, dry weather, which would not be removed until some heavy showers of rain have fallen and the ground is well drained and porous.

With regard to **analysis of water,** the results are generally stated in **grains per gallon**, and the first value given is the "**total solid matter,**" left on evaporation of water. This solid matter may contain besides mineral salts organic matter and small amounts of combined moisture, which are driven off, on heating the residue to dull red heat. The difference in weight before and after heating is recorded as "**loss on ignition.**"

The amount of "**chlorine**" in the water is given as such, and also calculated as **sodium chloride** or **salt,** although not necessarily all the chlorine is combined with soda, but may be present partially in form of magnesium chloride or calcium chloride. The "**hardness of water**" is expressed as lime carbonate, and when water is supposed to be used for boiler purposes the amount of **temporary hardness,** due to

mineral matters being removed on boiling the water, and the **permanent hardness,** due to more soluble lime and magnesia salts, remaining after boiling, are given. Any other alkalinity is recorded as sodium carbonate. When samples of water, intended for irrigation or watering of stock only, are taken for analysis, no special precautions, as recommended for drinking water, are necessary, and any ordinary clean bottle may be used, about a quart of water being required for analysis.

It would be of great interest to **collect evidence** throughout the State with regard to the **use of alkaline and saline waters** for irrigation and watering of stock. Any signs of disease in crops, or stock, should be carefully observed and reported to an inspector, who then could submit samples of the water in use for analysis, which would be made free of charge. In order to ascertain the tolerated amounts of salt and alkali, inspectors should inquire into cases, where such waters are successfully used, and submit such samples of water for analysis from time to time. In many cases the salinity of well water diminishes after the well has been in use for some time, and all such facts are well worth recording and reporting.

## TIMES OF SUNRISE AND SUNSET AT BRISBANE—1914.

| Date. | September. Rises. | September. Sets. | October. Rises. | October. Sets. | November. Rises. | November. Sets. | December. Rises. | December. Sets. |
|---|---|---|---|---|---|---|---|---|
| 1 | 6·3 | 5·33 | 5·29 | 5·47 | 4·58 | 6·5 | 4·46 | 6·28 |
| 2 | 6·2 | 5·34 | 5·28 | 5·48 | 4·58 | 6·6 | 4·46 | 6·28 |
| 3 | 6·1 | 5·34 | 5·27 | 5·48 | 4·57 | 6·7 | 4·46 | 6·29 |
| 4 | 6·0 | 5·35 | 5·26 | 5·49 | 4·56 | 6·7 | 4·46 | 6·30 |
| 5 | 5·59 | 5·35 | 5·25 | 5·49 | 4·56 | 6·8 | 4·46 | 6·31 |
| 6 | 5·58 | 5·36 | 5·24 | 5·50 | 4·55 | 6·9 | 4·46 | 6·31 |
| 7 | 5·57 | 5·36 | 5·23 | 5·50 | 4·54 | 6·9 | 4·46 | 6·32 |
| 8 | 5·56 | 5·37 | 5·21 | 5·50 | 4·54 | 6·10 | 4·46 | 6·33 |
| 9 | 5·54 | 5·37 | 5·20 | 5·51 | 4·53 | 6·11 | 4·46 | 6·33 |
| 10 | 5·53 | 5·37 | 5·19 | 5·52 | 4·52 | 6·11 | 4·47 | 6·34 |
| 11 | 5·52 | 5·38 | 5·18 | 5·52 | 4·52 | 6·12 | 4·47 | 6·35 |
| 12 | 5·51 | 5·38 | 5·17 | 5·53 | 4·51 | 6·13 | 4·47 | 6·36 |
| 13 | 5·50 | 5·39 | 5·16 | 5·53 | 4·51 | 6·14 | 4·47 | 6·36 |
| 14 | 5·49 | 5·39 | 5·15 | 5·54 | 4·50 | 6·14 | 4·48 | 6·37 |
| 15 | 5·48 | 5·40 | 5·14 | 5·54 | 4·50 | 6·15 | 4·48 | 6·37 |
| 16 | 5·46 | 5·40 | 5·13 | 5·55 | 4·49 | 6·16 | 4·48 | 6·38 |
| 17 | 5·45 | 5·41 | 5·12 | 5·56 | 4·49 | 6·17 | 4·48 | 6·39 |
| 18 | 5·44 | 5·42 | 5·11 | 5·56 | 4·49 | 6·18 | 4·49 | 6·39 |
| 19 | 5·43 | 5·42 | 5·10 | 5·57 | 4·48 | 6·18 | 4·49 | 6·40 |
| 20 | 5·42 | 5·42 | 5·9 | 5·57 | 4·48 | 6·19 | 4·50 | 6·40 |
| 21 | 5·41 | 5·42 | 5·8 | 5·58 | 4·47 | 6·20 | 4·50 | 6·41 |
| 22 | 5·40 | 5·43 | 5·7 | 5·58 | 4·47 | 6·21 | 4·51 | 6·42 |
| 23 | 5·38 | 5·43 | 5·6 | 5·59 | 4·47 | 6·22 | 4·51 | 6·42 |
| 24 | 5·37 | 5·44 | 5·5 | 6·0 | 4·47 | 6·22 | 4·52 | 6·43 |
| 25 | 5·36 | 5·44 | 5·4 | 6·0 | 4·47 | 6·23 | 4·52 | 6·43 |
| 26 | 5·35 | 5·45 | 5·4 | 6·1 | 4·46 | 6·24 | 4·53 | 6·43 |
| 27 | 5·34 | 5·45 | 5·3 | 6·2 | 4·46 | 6·25 | 4·53 | 6·44 |
| 28 | 5·33 | 5·46 | 5·2 | 6·2 | 4·46 | 6·25 | 4·54 | 6·44 |
| 29 | 5·32 | 5·46 | 5·1 | 6·3 | 4·46 | 6·26 | 4·54 | 6·44 |
| 30 | 5·30 | 5·47 | 5·0 | 6·4 | 4·46 | 6·27 | 4·55 | 6·45 |
| 31 | ... | ... | 4·59 | 6·5 | ... | ... | 4·56 | 6·45 |

PHASES OF THE MOON.

| Date | | Phase | H. | M. | |
|---|---|---|---|---|---|
| 5 Sept. | ○ | Full Moon | 12 | 1 | a.m. |
| 13 ,, | ☽ | Last Quarter | 3 | 48 | ,, |
| 20 ,, | ● | New Moon | 7 | 33 | ,, |
| 26 ,, | ☾ | First Quarter | 10 | 3 | p.m. |
| 4 Oct. | ○ | Full Moon | 3 | 59 | p.m. |
| 12 ,, | ☽ | Last Quarter | 7 | 33 | ,, |
| 19 ,, | ● | New Moon | 4 | 33 | ,, |
| 26 ,, | ☾ | First Quarter | 8 | 44 | a.m. |
| 3 Nov. | ○ | Full Moon | 9 | 49 | a.m. |
| 11 ,, | ☽ | Last Quarter | 9 | 37 | ,, |
| 18 ,, | ● | New Moon | 2 | 2 | ,, |
| 24 ,, | ☾ | First Quarter | 11 | 39 | p.m. |
| 3 Dec. | ○ | Full Moon | 4 | 21 | a.m. |
| 10 ,, | ☽ | Last Quarter | 9 | 32 | p.m. |
| 17 ,, | ● | New Moon | 12 | 35 | ,, |
| 24 ,, | ☾ | First Quarter | 6 | 25 | ,, |

# General Notes.

## TO OWNERS OF TEAMS AND MOTOR AND STEAM ENGINES.

At this critical time, when it is the duty of all to help in whatever way we can, and incidentally to as far as possible increase the area under wheat so as to make Queensland independent of the other States and thus set free a corresponding quantity for use elsewhere, the Minister for Agriculture draws attention to the fact that there must be many teams and steam and motor engines that, owing to the restriction in the transport of wool and other material, are probably not finding as much work as they need.

No doubt there are many farmers who are hampered in their desire to help in adding to the area under wheat by the want of additional motive and horse power, and it is suggested that here lies an opportunity for those whose teams or engines are idle to obtain employment. One of the conditions under which financial assistance will be given by the Minister towards increasing the area under wheat is for the hire of horses or motor power, and if any owner who desires employment of this nature cannot find it, he should communicate with the Under Secretary, Department of Agriculture, stating the conditions under which he is prepared to accept work—contract or otherwise; whereupon assistance will be given in arranging matters for him.

## NATIVE BIRDS PROTECTION ACTS.

### DESTRUCTION OF NATIVE BIRDS.

Notwithstanding the many insect pests which damage or destroy crops of all descriptions, it seems impossible to impress upon the holiday-maker's mind that, were it not for insectivorous birds, these pests would increase to such an extent as to make the raising of field crops, vegetables, and fruit too expensive a business to be profitable. Even a gun tax, to include the mischievous pea-rifle, would be powerless to protect the birds, in consequence of the practical impossibility of enforcing it in country districts. Whilst the legitimate sportsman carefully observes the close season for game birds, the boy with the pea-rifle is troubled with no conscientious scruples on that score. He looks upon every member of the feathered tribe which comes within reach of his weapon as the legitimate object of his nefarious sport. If the attention of these shooters were directed only towards the fruit or leaf eating birds, no objection could be raised towards their sacrificing thousands of them. Unfortunately, they cannot discriminate between

useful and destructive birds; and who is there to teach them? If every State and private school were supplied with well-executed coloured plates of both classes, the teachers would be able to do a great deal towards minimising the evil. We proposed at one time to issue with every Journal one or two such coloured plates, but, unfortunately, these are expensive, and the times have of late been too bad to enable us to carry out the idea. But we shall by no means lose sight of it. Take a few of our insectivorous birds, such as crows, ibis, curlews, owls, night-jars (otherwise moreporks), &c. The crow is generally cunning enough to distinguish between a stick and a gun, and less frequently falls a victim to the gunner. Crows, although they are notorious for destroying chickens, young birds, hares, &c., yet render signal service to the farmer by destroying mice, cutworms, wireworms, &c. It has been calculated in Germany by Herr Rörig that "a field mouse and its progeny will destroy 1,000 plants of grain whilst the latter are developing." We know what tremendous losses the plague of mice inflicted on farmers last year. He also stated that "About 3,000 crows, by destroying mice and other vermin, benefit farmers to the amount of £2,500 per annum In other words, what is commonly but erroneously known as the carrion crow benefits him to the amount of 11d. per bird per annum over and above the loss it causes him by the destruction of chickens, eggs," &c. Anyone who has watched the flocks of ibis on newly-ploughed land, thrusting their long curved bills deep into the soil, and devouring thousands of worms, grubs, beetles, and larvæ, must be impressed with the great value of these birds; yet how often are they shot in mere wantonness and left to rot on the ground? The number of mice consumed by owls is something incredible.

In 1905 we were indebted to Mr. Hy. Tryon, Government Entomologist and Vegétable Pathologist, for the following information on the food of various birds. He has closely studied their habits and examined their stomachs. This scientific phase of the question we do not attempt to deal with; the object of this article is to draw attention to the indiscriminate shooting of birds, destructive or useful, for no other purpose but sport, or "to keep one's hand in," as swallow and marten shooters express it:—

## INSECTIVOROUS AND PARTLY INSECTIVOROUS BIRDS.

*Ibis.*—The food of the birds comprised by this name consists of frogs, especially in the tadpole state, grasshoppers, grass-eating caterpillars, ground-frequenting caterpillars, soil-frequenting "grubs" generally, young fish, &c.

*Carrion Crow.*—No bird in Australia bears this name that may be erroneously bestowed on the common crow or raven, or on the white-eyed crow, both of which possess feeding habits distinct from those of the European "carrion crow." The food of the bird of coastal Queensland, the former of the two kinds mentioned, includes grasshoppers, locusts, cicadas, moths, grass-eating caterpillars, soil-frequenting grubs, and large insects generally. Ticks, rats and mice, eggs of poultry and

wild birds, young chickens and ducks (exceptionally); seeds of cereals when broadcasted, plantlets of cereals, maize from the cob (exceptionally), lambs, the eyes of cast ewes and of bogged sheep and cattle; fruit, *e.g.*, pineapples and watermelons; carrion and offal generally.

*Pied Crow* (*Shrike*).—Insects of various kinds, especially the larger ones—*e.g.*, grasshoppers, locusts, &c.; seeds, berries of wild and cultivated trees, coffee berries, fruit generally—oranges, figs, grapes, strawberries, to most kinds of which it is highly destructive; carrion, including dead birds, &c.

*Morepork* (Ninix).—The smaller kinds feed on various nocturnal insects, on rodents, on small birds, on young domesticated pigeons. The largest kinds the same, and on birds as large as a laughing jackass—*Dacelo sp.* (Brennan).

*Night-jar.*—On various nocturnal flying insects, and especially on moths.

*Laughing Jackass.*—On large insects, grasshoppers, locusts, &c., lizards, iguanas (small), snakes, small rodents (rats and mice), chickens, young birds.

*Kingfishers* (1. *Halcyon*).—Feed on grasshoppers, mantidæ, noctuid caterpillars, lizards (small), tree frogs, spiders, tipulid flies, beetles, white-ants.

*Kingfishers* (2. *Alcyone*).—Small fish, aquatic insects, flying insects hovering over water.

*Butcher Birds* (*Cracticus spp.*).—Feed on large insects (grasshoppers, &c.), small lizards and other reptiles, small snakes, caterpillars, soil-frequenting "grubs," small rodents (mice, &c.), nestling birds, small birds both wild and domesticated, very young chickens, hive bees (exceptionally).

*Dollar Birds.*—Insects (especially beetles) occurring on the wing and in tree-tops; hive bees (exceptionally).

The whole of the State is now under the operation of the Acts, and Queensland is divided into two districts, for which two distinct close seasons are provided. New names have been included in the lists of protected birds. Schedule A contains the names of those totally protected, while in Schedule B will be found those to which partial protection only is afforded. Considering the valuable asset insectivorous birds are to the State, and especially to those people whose occupation is connected with the land, there should be ready assistance given to the Department in the protection of our native birds. It should be noted that any person can prosecute under the Acts.

Reserves can be proclaimed with the consent of the owner or occupier of private lands, and rangers (honorary) appointed when a reserve has been created.

The following particulars—showing the birds which are subject to the operation of the Native Birds Protection Acts, the periods of the year during which the Acts are in operation, and the reserves set apart for the preservation and protection of such birds—are published for general information:—

# BIRDS ABSOLUTELY PROTECTED THROUGHOUT QUEENSLAND.

## SCHEDULE A.

| Common Name. | Technical Designation. |
|---|---|
| Australian Bee-eaters | Merops |
| Babblers | Timeliidæ |
| Bell Birds | Oreoica |
| Bitterns | Ardeiformes |
| Black Cockatoos of all species | Calyptorhynchus |
| Black Swans | Anatidæ |
| Bower Birds of all species | Ptilonorhynchidæ |
| Bush Chats of all species | Ephthianurinæ |
| Cassowaries | Casuariidæ |
| Caterpillar-eaters | Campophagidæ |
| Coachwhip Birds | Timeliidæ |
| Coucals or Swamp Pheasants | Centropodinæ |
| Cuckoo Shrikes | Campophagidæ |
| Cuckoos of all species | Cuculidæ |
| Diamond Birds (Pardalotes) | Dicæidæ |
| Dollar Birds (Rollers) | Eurystomus |
| Egrets of all species | Ardeiformes |
| Fantails | Muscicapidæ |
| Field Wrens | Timeliidæ |
| Flower-peckers | Dicæidæ |
| Fly-catchers (Wagtails) | Muscicapidæ |
| Fly-eaters | Muscicapidæ |
| Frogmouths | Podargidæ |
| Grebes | Podicipediæ |
| Herons | Ardeiformes |
| Honey-eaters (except Miners, Wattle Birds, Friar Birds) | Meliphagidæ |
| Ibises | Ardeiformes |
| Jabirus | Ardeiformes |
| Kingfishers (all species) | Alcedinidæ |
| Kites | Elanus |
| Land Curlews or Stone Plovers | Œdicnemidæ |
| Larks of all species | Motacillidæ, Alaudidæ |
| Laughing Jackasses | Alcedinidæ |
| Lyre Birds | Menuridæ |
| Magpies | Gymnorhina |
| Magpie Larks | Grallina |
| Martins | Hirundinidæ |
| Nightjars or Goat-suckers | Caprimulgidæ |
| Nuthatches or Tree-runners (Woodpeckers) | Sittidæ |
| Owls | Strigidæ |
| Parras | Parridæ, Glareolidæ |
| Parrots (Ground or Swamp) | Pezoporus |
| Pipits | Motacillidæ, Alaudidæ |
| Pittas of all species | Pittidæ |
| Pratincoles | Parridæ, Glareolidæ |
| Regent Birds | Genus Sericulus (Ptilonorhynchidæ) |
| Rifle Birds | Paradiseidæ |
| Robins of all Species | Muscicapidæ |
| Satin Birds | Genus Ptilonorhynchus (Ptilonorhynchidæ) |
| Shining Starlings (Calornis) | Eulabetidæ |
| Shrike Tits | Muscicapidæ |
| Song Larks | Timeliidæ |
| Spoonbills | Ardeiformes |
| Storks | Ardeiformes |
| Swallows | Hirundinidæ |
| Swamp Pheasants | Centropodinæ |
| Swifts | Cypselidæ |
| Thickheads (Whistlers) | Muscicapidæ |
| Thrushes of all species | Turdidæ, Prionopidæ |
| Tit Warblers (Tree Tits) | Sylviidæ |
| Tree-creepers | Climacteris |
| Tree-runners | Sittidæ |
| Warblers | Sylviidæ |
| White-eyes or Silver-eyes | Zosteropidæ |
| Wood Swallows | Artamidæ |
| Wren Warblers | Sylviidæ |
| Wrens of all species | Sylviidæ |

# BIRDS PARTIALLY PROTECTED THROUGHOUT QUEENSLAND.

## SCHEDULE B.

| Common Name. | Technical Designation. |
|---|---|
| Bronzewing Pigeons | Columbæ |
| Brown Hawks | Falconidæ |
| Bustards or Plain Turkeys | Otididæ |
| Coots | Rallidæ |
| Cranes | Gruidæ |
| Crakes | Rallidæ |
| Curlews | Charadriidæ |
| Dottrels | Charadriidæ |
| Doves | Columbæ |
| Ducks, Wild, of all species | Anatidæ (excepting Black Swans) |
| Emus | Dromæidæ |
| Fig Birds | Oriolidæ |
| Finches (including Plumhead, Banded, Painted, Zebra, and Redheaded Finches, &c.) | Ploceidæ |
| Geese, Wild | Anatidæ (excepting Black Swans) |
| Land Rails | Rallidæ |
| Mallee Fowls | Megapodiidæ |
| Moor Hens | Rallidæ |
| Native Companions | Gruidæ |
| Native Hens | Rallidæ |
| Orioles | Oriolidæ |
| Pigeons, all Wild | Columbæ |
| Plovers | Charadriidæ |
| Quails | Phasianidæ, Turnicidæ |
| Rails, Land and Water | Rallidæ |
| Scrub or Brush Turkeys | Megapodiidæ |
| Scrub Fowls | Megapodiidæ |
| Sea Birds, all | |
| Turkeys, Plain and Scrub or Brush | Otididæ and Megapodiidæ |
| Waders | Charadriidæ |
| Water Rails | Rallidæ |

*Close Seasons.*

In District No. 1, from the first day of September in each year to the thirty-first day of March in the following year, inclusive.

In District No. 2, from the first day of November in each year to the thirty-first day of May in the following year, inclusive.

(With the exception of emus on prickly-pear infested lands, where the close season shall be from the first to the seventh day of July in each year.)

For districts, *see* map.

## PENALTIES.

If any person shall wilfully kill or destroy any protected native bird, or shall use any instrument whatever, net, or other means for the purpose of killing or destroying any native birds, within the periods hereinbefore mentioned, such person shall, upon conviction, **pay a fine of not less than one pound or more than five pounds.**

If any person shall buy, sell, or knowingly have in his possession, house, or control any native bird at any time within the period hereinbefore mentioned, he shall **pay a penalty not less than one pound or more than five pounds for every bird.**

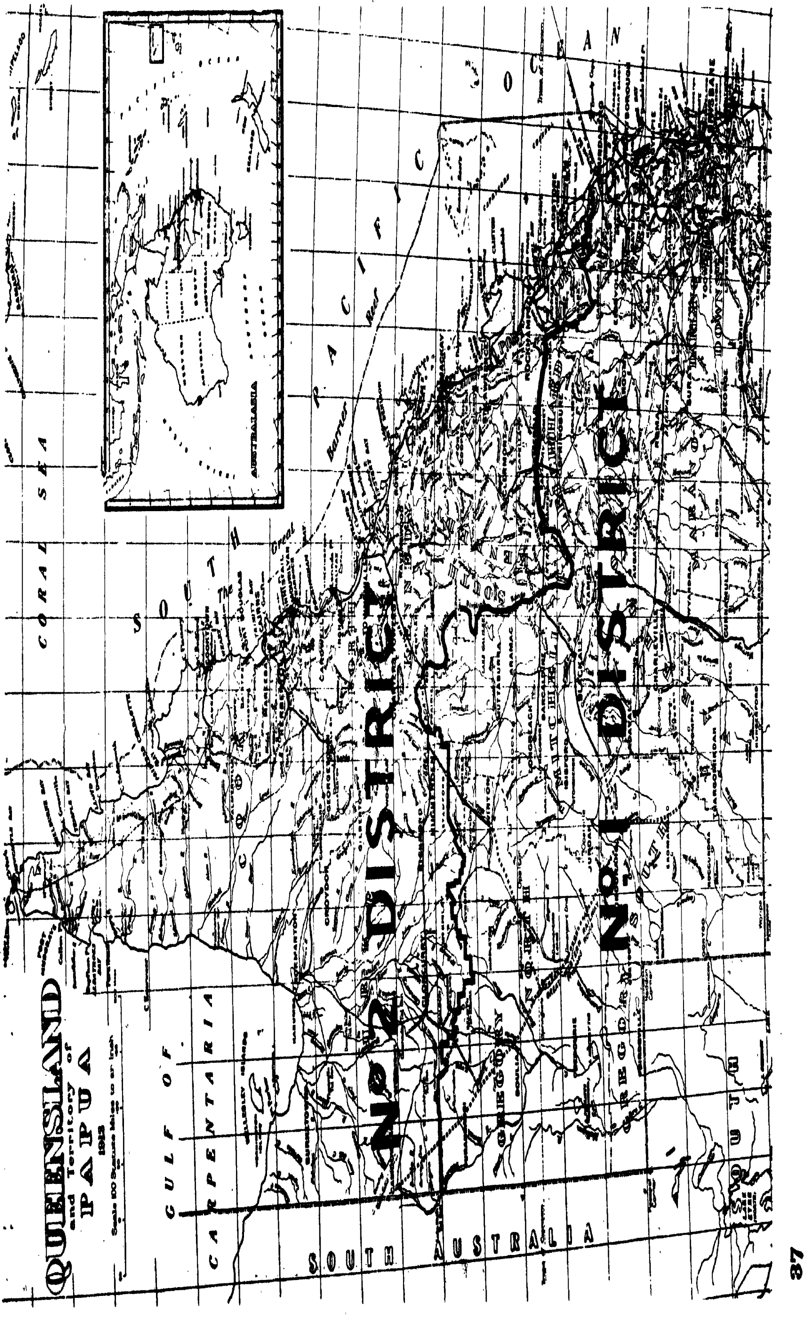
If any person wilfully kills, destroys, or captures any native bird, or uses any instrument, net, or any other means whatever for the purpose of killing, destroying, or capturing any such bird, while it is within or flying over a reserve, he shall be liable upon conviction to pay **a fine of not less than one pound or more than five pounds.**

A moiety of every penalty recovered under the Act shall be paid to the person or persons laying the information.

# LIST OF RESERVES WITHIN WHICH THE DESTRUCTION OF NATIVE BIRDS IS PROHIBITED DURING THE WHOLE YEAR.

| Situation of Reserve. | For Proclamation and Boundaries see Government Gazette. Date. | Part. | Page. |
|---|---|---|---|
| Parish of Enoggera, county of Stanley (Enoggera Reservoir and Catchment Area) | 29 Aug., 1885 | II. | 769 |
| Parish of Gracemere, county of Livingstone ... ... | 29 Aug., 1885 | II. | 769 |
| Parishes of Toorbul, Beerwah, and Bribie, county of Canning (Pumice Stone Channels and the shores thereof) | 12 Sep., 1885 | II. | 897 |
| **Parishes of Crow's Nest and Douglas, counties of Cavendish and Aubigny* | 10 Oct., 1885 | II. | 1253 |
| **Parish of Emu Creek, county of Cavendish* ... ... | | | |
| **Parish of Douglas, county of Aubigny* ... ... ... | | | |
| Parish of Nerang, county of Ward, Southport ... ... | 5 June, 1886 | I. | 1946 |
| Parishes of Moggill and Indooroopilly, county of Stanley (Gold Creek and Moggill Creek Drainage Areas) | 13 July, 1889 | II. | 797 |
| Parish of Boonara, county of Mackenzie (on the leased part of Boonara Run) | 14 Sep., 1889 | III. | 99 |
| Parishes of Enoggera and Indooroopilly, county of Stanley (Mount Coot-tha Reserve) | 20 Dec., 1890 | III. | 1403 |
| Parish of Oxley, county of Stanley (Chelmer Recreation and Water Reserve) | 4 Mar., 1893 | I. | 670 |
| Parish of Hewittville, county of Livingstone (Reserve for Water, Emu Park) | 18 July, 1893 | II. | 583 |
| Parish of Ossa, county of Carlisle, Seaforth ... ... | 1 Jan., 1898 | I. | 21 |
| Parishes of Cressbrook, Bowman, and Neara, county of Canning | 11 June, 1898 | I. | 1596 |
| Lake Clarendon ... ... ... ... ... ... ... ... | 24 Mar., 1900 | I. | 961 |
| England and Clarendon ... ... ... ... ... ... | 25 June, 1900 | I. | 1650 |
| Fitzroy, Nicholson, Faraday, Calioran ... ... ... | 6 July, 1901 | II. | 564 |
| Gavial and Gracemere (The Duck Pond) ... ... ... | 13 July, 1901 | II. | 633 |
| Horseshoe Lagoon, parish of Selkirk ... ... ... | 16 Aug., 1902 | II. | 421 |
| Cloyna ... ... ... ... ... ... ... ... ... | 28 Dec., 1901 | III. | 990 |
| Parishes of Antill and Jarvisfield ... ... ... ... | 30 July, 1904 | II. | 249 |
| Parish of Jarvisfield (Church Lagoon) ... ... ... | | | |
| Ditto (Red Lily Lagoon) ... ... ... | | | |
| Parish of Rockhampton (Murray's and Jardine's Lagoons) | 27 Aug., 1904 | II. | 493 |
| Parish of Charters Towers (Burdekin Weir) ... ... | 29 Oct., 1904 | II. | 901 |
| Dunk, Kumboola Island, and Mount Islet, the Family Islands (comprising Thorpe, Richards, Wheeler, Coombe, Bowden, Smith, and Hodson Islands), and Brooks Islands | 13 May, 1905 | I. | 1546 |
| Parish of Yeerongpilly (Russell Wilkins) ... ... | 16 Dec., 1905 | II. | 1273 |
| Ditto (Water Reserve) ... ... | | | |
| Parish of Enoggera (Private lands on Toowong Creek) | 11 Aug., 1906 | II. | 274 |
| Parish of Yaamba (P. F. MacDonald's property) ... | 8 Sep., 1906 | II. | 514 |
| Parish of Noogoon (Mud Island) ... ... ... ... | 8 Dec., 1906 | II. | 1195 |
| Parish of Broadmere (Lake Murphy ... ... ... | 13 Feb., 1909 | I. | 341 |
| County of Stanley (The Redcliffe Shire) ... ... ... | 20 Mar., 1909 | I. | 738 |
| Parishes of Wyseby and Aubrey (Stud Farm for Breeding Police Horses) | 10 July, 1909 | II. | 70 |
| Parish of Pentland (Pentland Dam and Swamp) ... ... | 24 July, 1909 | II. | 220 |
| Parish of Dugandan (A. J. McConnell's property) ... | 4 Sep., 1909 | II. | 587 |
| County of Nares (The Douglas Shire) ... ... ... | 16 April, 1910 | I. | 1002 |
| County of Elphinstone (Abattoir Reserve, Townsville) ... | 21 May, 1910 | I. | 1326 |
| Parish of Taylor, Toowoomba District (Jubilee Park), Redwood Park, Picnic Point, and One-tree Hill) | 8 Oct., 1910 | II. | 1010 |
| Parish of Tingalpa (Shire of Wynnum) ... ... ... | 18 Feb., 1911 | I. | 930 |
| Gladstone Land Agent's District (Capricorn Group of Islands) | 5 Aug., 1911 | II. | 422 |
| Mackay Land Agent's District (Orphanage Swamp and Denman's Water Hole) | 23 Sep., 1911 | II. | 820 |
| Parishes of Rockybar and Eumara (Reeves Lake, &c., on Eumara and Gainsford Holdings) | 29 June, 1912 | I. | 1711 |
| Shire of Widgee ... ... ... ... ... ... ... ... | 20 Dec., 1913 | II. | 1741 |
| Parish of Stradbroke (Myora) ... ... ... ... ... | 11 April, 1914 | I. | 1036 |
| Shire of Maroochy ... ... ... ... ... ... ... | 2 May, 1914 | I. | 1173 |
| County of Ward, area on coast from Southport to Pt. Danger | 4 July, 1914 | II. | 78 |

*** Note.—These reserves are for the protection of the following birds only:—Tallegallas or Scrub Turkeys, Bronzewing and all Wild Pigeons, Emus, Regent Birds, Quails.**


QUEENSLAND
and Territory of
PAPUA
1912
CORAL SEA
SOUTH PACIFIC OCEAN
The Great Barrier Reef
GULF OF CARPENTARIA
SOUTH AUSTRALIA
AUSTRALASIA
No. 1 DISTRICT
No. 2 DISTRICT
37

# Answers to Correspondents.

## TO REMOVE A SPLINT IN A HORSE'S LEG.

The following blister has been found beneficial in removing splints:—Bicloride of mercury 1 drachm, iodine 1 drachm, methylated spirit 1 drachm. The splint should be painted with the above blister once every week. A little lard should be placed beneath the affected part, so as to prevent the blister affecting the healthy bone.

## STRANGLES IN HORSES.

When the disease appears, the animal should be isolated from other horses. He should be made as comfortable as possible, having plenty of fresh air and a liberal supply of cold water. As the disease progresses give soft nourishing food—*e.g.*, bran mashes. Boiled linseed should be given. When the cough appears the throat should be well rubbed with a mixture of mustard and water, and the following powder given twice daily in drinking water—chlorate of potash, nitrate of potash, each 2 dr. If a discharge appears at the nostrils, the animal's food should be placed on the ground. In the case of the nine-year-old horse mentioned, it seems that he is suffering from Irregular Strangles, in which case tonics, such as 1 oz. Liquor arsenicalis, should be given in drinking water daily.

## DESTRUCTION OF HOUSE-FLIES.

H. K., Ingham—

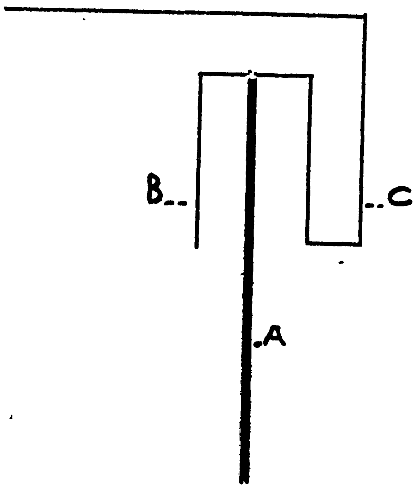
With reference to your inquiry *re* house-flies, Mr. H. Tryon, Government Entomologist and Vegetable Pathologist, replies:—

"By the term 'Flies,' it is assumed that he is referring to ordinary 'house-flies,' but this is uncertain. However, as there are other kinds of these insects than house-flies proper (*Musca domestica*) that frequent houses and, although generally resembling them, are specifically distinct, he should therefore remit specimens.

"The subjugation of house-flies proper is greatly assisted if their breeding habits are taken into consideration. They are, it may be stated, much addicted to laying their eggs and developing as maggots in stable manure, but affect for this purpose also horse-droppings and, to a less extent, those derived from cattle and pigs. Again, a favourite nidus for them is the contents of privies and night-soil promiscuously deposited, but almost any rubbish, especially if moist and undergoing fermentation, will yield sustenance for the maggots—their young.

"In dealing with them, the foregoing facts should receive careful attention, and the matters referred to should be secured, as far as possible, against their access by being kept in bins or other receptacles, or, where this is not practicable, should be poisoned or rendered repugnant to them by being well dressed with kerosene or crude oil or carbolic acid (soluble phenyl). The matters found in outhouses, and referred to

above as serving also as breeding-places for the flies, should be always kept covered with dry earth or sand, freely impregnated with one or other of the hydrocarbons mentioned. Nightsoil, moreover, and kitchen refuse, if simply burned, should be well covered with earth, largely composed of loose sand, to a depth of over 2 ft., but any covering assists house-fly repression. Flies also can be trapped in various ways. Outside the house by a modified rubbish tin—it having a space of about ¼ in. between the rim of the cover and the receptacle, held in position by three metal loops, and having in the top of the cover a round hole that admits the light and into which is fixed a wide-gauze receptacle. Flies gaining access to this through the space are attracted by light to the hole and so enter the gauze cage.




*Trap in Section.*

*a.* Side of tin.

*b.* Metal loop for supporting cover.

*c.* Side of cover or rim ¼ in. beyond side of tin and top of cover, also above sides.

"In using this, the tin itself is partially filled with food substances that the flies are known to affect.

"Within the house, the flies may be captured by the use of fly-papers or fly-traps, of which there are several in the market. Again, they may be poisoned in one way or another. For example, with a mixture composed of—Formalin, 2 oz.; sugar, 2 oz.; and water, 10 oz. This to be used in saucers or other shallow vessels, in each of which also is placed a small piece of bread (crust) to serve as an alighting ground for the insects. Milk may be substituted for the sugar and water. The success of this poison will, of course, be dependent on the fact that the flies are debarred from access to other fluids in the dwelling-rooms whence they might derive their liquid aliment."

## LICE ON DOGS AND CATS.

A correspondent asks for a remedy. Mr. A. McGown, M.R.C.V.S., advises that the dog be washed with a solution of Scares acre 1 part, water 20 parts, and on the following day again washed with carbolic soap and rape oil. With reference to dog losing flesh and faltering in the hindquarters, Mr. McGown advises that from the symptoms given, the animal appears to be suffering from worms. If so, 1 oz. of castor oil should be given on an empty stomach. When this has operated, 2 drachms of freshly-powdered Areca nut should be placed on the back of the tongue, and the animal made to swallow it. This should be followed by another dose of castor oil.

# Statistics.

## RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF OCTOBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING OCTOBER, 1913 AND 1914, FOR COMPARISON.

| Divisions and Stations. | Average Rainfall. Oct. | Average Rainfall. No. of Years' Records. | Total Rainfall. Oct., 1914. | Total Rainfall. Oct., 1913. |
|---|---|---|---|---|
| *North Coast.* | In. | | In. | In. |
| Atherton ... ... | 0·74 | 13 | 1·50 | 0·48 |
| Cairns ... ... | 1·60 | 27 | 2·32 | 2·83 |
| Cardwell ... ... | 1·74 | 27 | 3·14 | 1·46 |
| Cooktown ... ... | 0·94 | 27 | 0·86 | 2·54 |
| Herberton ... ... | 0·96 | 27 | 0·95 | 0·66 |
| Ingham ... ... | 1·39 | 22 | 3·39 | 1·32 |
| Innisfail ... ... | 2·45 | 27 | 7·33 | 3·13 |
| Mossman ... ... | 3·31 | 5 | 4·22 | 4·17 |
| Townsville ... ... | 1·18 | 30 | 0·38 | 0·31 |
| *Central Coast.* | | | | |
| Ayr ... ... ... | 0·88 | 27 | 0·08 | 0·12 |
| Bowen ... ... | 0·88 | 27 | 0·54 | Nil |
| Charters Towers ... | 0·75 | 27 | 0·01 | Nil |
| Mackay ... ... | 1·69 | 27 | 3·86 | 0·03 |
| Proserpine ... ... | 1·48 | 11 | 3·18 | 0·05 |
| St. Lawrence ... | 1·69 | 27 | 5·77 | Nil |
| *South Coast.* | | | | |
| Crohamhurst ... | 3·71 | 20 | 6·42 | 0·33 |
| Biggenden ... ... | 2·23 | 14 | 4·05 | 1·04 |
| Bundaberg ... ... | 1·97 | 27 | 6·36 | 0·18 |
| Brisbane ... ... | 2·75 | 63 | 2·47 | 0·78 |
| Childers ... ... | 2·02 | 19 | 4·95 | 0·30 |
| Esk ... ... ... | 2·45 | 27 | 3·63 | 0·95 |
| Gayndah ... ... | 2·24 | 27 | 2·94 | 0·47 |
| Gympie ... ... | 2·42 | 27 | 4·94 | 0·15 |
| Glasshouse M'tains | 3·40 | 6 | 3·45 | 0·27 |
| Kilkivan ... ... | 2·59 | 27 | 1·19 | 0.53 |
| Maryborough ... | 2·11 | 27 | 5·00 | 3·51 |
| *South Coast—continued:* | In. | | In. | In. |
| Mount Larcom ... | ... | ... | 5·33 | ... |
| Nanango ... ... | 2·28 | 27 | 3·12 | 0·27 |
| Rockhampton ... | 1·65 | 27 | 5·69 | Nil |
| Woodford ... ... | 2·74 | 27 | 3·92 | 1·09 |
| Yandina ... ... | 3·28 | 21 | 6·25 | 0·07 |
| *Darling Downs.* | | | | |
| Dalby ... ... | 2·27 | 27 | 1·45 | 0·65 |
| Emu Vale ... ... | 2·60 | 17 | 2·16 | 2·26 |
| Jimbour ... ... | 2·01 | 24 | 0·99 | 1·37 |
| Miles .. ... | 2·09 | 27 | 2·73 | 1·12 |
| Stanthorpe ... | 2·48 | 27 | 2·46 | 3·03 |
| Toowoomba ... | 2·56 | 27 | 3·96 | 2·33 |
| Warwick ... ... | 2·42 | 27 | 2·70 | 2·04 |
| *Maranoa.* | | | | |
| Roma .. ... | 1·84 | 25 | 0·82 | 1·19 |
| *State Farms, &c.* | | | | |
| Gatton College ... | 2·56 | 14 | 3·96 | 1·87 |
| Gindie ... ... | 1·17 | 13 | 4·43 | Nil |
| Kamerunga Nurs'y | 1·53 | 23 | 3·71 | 1·38 |
| Kairi ... ... | ... | ... | 0·84 | 0·60 |
| Sugar Experiment Station, Mackay | 1·60 | 16 | 4·75 | Nil |
| Bungeworgorai ... | ... | ... | 1·36 | 1·84 |
| Warren ... ... | ... | ... | 2·85 | Nil |
| Hermitage ... | 2·15 | 7 | 1·90 | 3·45 |

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for October this year and for the same period of 1913, having been compiled from telegraphic reports, are subject to revision.

# The Markets.

## PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR NOVEMBER, 1914.

| Article. | | NOVEMBER. Prices. |
|---|---|---|
| Bacon | lb. | 9d. to 10½d. |
| Bran | ton | £7 15s. |
| Butter | cwt. | 106s. |
| Chaff, Mixed | ton | £6 to £7 |
| Chaff, Oaten (Victorian) | ,, | £7 10s. to £8 |
| Chaff, Lucerne | ,, | £7 to £7 10s. |
| Chaff, Wheaten | ,, | £6 to £6 5s. |
| Cheese | lb. | 6¾d. to 7d. |
| Flour (Official Price) | ton | £9 10s. |
| Hams | lb. | 1s. 2½d. to 1s. 3½d. |
| Hay, Oaten (Victorian) | ton | £7 to £7 10s. |
| Hay, Lucerne (Prime) | ,, | £6 5s. to £6 15s. |
| Honey | lb. | 2½d. |
| Maize | bush. | 3s. 5d. |
| Oats | ,, | 3s. 11d. to 4s. |
| Onions (Victorian, Japanese, American) | ton | £14 to £17 |
| Peanuts | ,, | 3½d. |
| Pollard | lb. | £7 15s. |
| Potatoes (Old) | ton | £5 |
| Potatoes (New) | ,, | £6 to £7 10s. |
| Potatoes (Sweet) | cwt. | 1s. 6d. to 2s. 6d. |
| Pumpkins | ton | £1 10s. to £2 |
| Wheat, Milling | bush. | 4s. 6d. |
| Eggs | doz. | 8d. to 9d. |
| Fowls | pair | 3s. to 6s. 6d. |
| Geese | ,, | 6s. 6d. to 7s. |
| Ducks, English | ,, | 3s. 6d. to 4s. |
| Ducks, Muscovy | ,, | 4s. to 5s. 6d. |
| Turkeys (Hens) | ,, | 7s. 6d. to 8s. 6d. |
| Turkeys (Gobblers) | ,, | 14s. to 16s. |

## SOUTHERN FRUIT MARKETS.

| Article. | NOVEMBER. Prices. |
|---|---|
| Bananas (G.M.), per case | 22s. 6d. to 23s. |
| Bananas (Tweed River, Cavendish), per case | 9s. to 12s. |
| Bananas (Fiji), per case | 19s. to 20s. |
| Mandarins (Queensland), per case | 10s. to 15s. |
| Oranges (Navel), per case | 10s. to 15s. |
| Oranges (Seville), per case | 6s. to 7s. |
| Oranges (other), per case | 9s. to 12s. |
| Passion Fruit, per half-case | 2s. to 11s. |
| Papaw Apples, per half-case | 1s. 6d. to 3s. |
| Pineapples (Queens), per case | 13s. to 15s. |
| Pineapples (Ripleys), per case | 10s. to 14s. |
| Pineapples (Common), per case | 10s. to 13s. |
| Tomatoes, per quarter-case | 4s. to 5s. |

## PRICES OF FRUIT—TURBOT STREET MARKETS.

| Article. | NOVEMBER. Prices. |
|---|---|
| Apples, Eating, per case | 15s. to 17s. |
| Apples Cooking, per case | 15s. to 17s. |
| Apricots, per quarter-case | 4s. to 8s. |
| Bananas (Cavendish), per dozen | 2d. to 4½d. |
| Bananas (Sugar), per dozen | 2½d. to 3½d. |
| Cape Gooseberries, per quarter-case | 4s. 6d. to 7s. |
| Cherries, per quarter-case | 7s. 6d. to 15s. |
| Citrons, per cwt. | ... |
| Cocoanuts, per sack | 12s. to 15s. |
| Cumquats, per case | ... |
| Custard Apples, per quarter-case | ... |
| Lemons, per case | 5s. to 7s. 6d. |
| Lemons (Italian), per case | 12s. to 15s. |
| Limes, per case | ... |
| Mandarins, per case | 6s. to 10s. |
| Mangoes, per case | 4s. |
| Oranges (Navel), per case | 8s. to 12s. |
| Oranges (other), per case | 7s. to 10s. |
| Papaw Apples, per quarter-case | 1s. 6d. to 3s. 6d. |
| Passion Fruit, per case | 9s. to 11s. |
| Peaches, per quarter-case | 5s. to 10s. |
| Peanuts, per pound | 3½d. |
| Pears, per quarter-case | ... |
| Persimmons, per quarter-case | ... |
| Pineapples (Ripley), per dozen | 6s. to 9s. 6d. |
| Pineapples (Rough), per dozen | 4s. 6d. to 6s. |
| Pineapples (Smooth), per dozen | 4s. to 7s. |
| Plums, per case | ... |
| Rockmelons, per dozen | 2s. 6d. to 7s. 6d. |
| Rosellas, per sugar bag | ... |
| Strawberries, per tray | ... |
| Strawberries, per dozen boxes | 4s. to 10s. |
| Tomatoes, per quarter-case | 1s. to 5s. |
| Watermelons, per dozen | 10s. to 18s. |

## TOP PRICES, ENOGGERA YARDS, OCTOBER, 1914.

| Animal. | OCTOBER. Prices. |
|---|---|
| Bullocks | £12 15s. to £15 15s. |
| Cows | £9 15s. to £11 |
| Merino Wethers | 23s. 3d. |
| Crossbred Wethers | 22s. |
| Merino Ewes | 17s. 3d. |
| Crossbred Ewes | 21s. |
| Lambs | 18s. 6d. |
| Pigs (Porkers) | ... |

# Farm and Garden Notes for January.

FIELD.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean.* Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish Blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole.

KITCHEN GARDEN.—A first sowing of cabbages, cauliflower, and Brussels sprouts may now be made in a covered seed bed, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering. Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflowers, mustard, cabbage, celery, radish, for Autumn and Winter use. Sow celery in shallow, well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter are, however, unlikely to succeed, except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the early worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; also garlic, onions, and eschalots as the tops die down.

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* See article in this issue by G. B. Brooks, Instructor in Agriculture, on Potato-growing.

FLOWER GARDEN.—To make the flower beds gay and attractive during the Autumn and Winter months is not a matter of great difficulty. Prepare a few shallow boxes. Make a compost, a great part of which should consist of rotten leaves. Fill the boxes with the compost, then sow thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle lift them gently one by one with a knife or a zinc label—*never pull them up by hand*, as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty of leaf mould. Then keep a sharp lookout for slugs and caterpillars. Keep a supply of tobacco dust on hand, and scatter this in the path of the slug, and he will cease from troubling you.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to overwater at this season. Propagate verbenas, not forgetting to include the large scarlet Fox-hunter. Verbenas require rich soil. Palms may be planted out this month. If the weather proves dry, shade all trees planted out. With seed boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work. The flower garden in Autumn and Winter will present a charming sight and will afford light and profitable work for girls with spare time on their hands.

An exhaustive booklet on "Flower Gardening for Amateurs" has been issued by the Department of Agriculture and Stock, and may be obtained from the Office. Price, 2s.

# Orchard Notes for January.

## THE SOUTHERN COAST DISTRICTS.

The fruit of the month in this part of the State is the grape, and its gathering and marketing will occupy the attention of growers. Care should be taken to cut the fruit when cool and dry, and if it has to be sent any distance the stems of the bunches should be allowed to wilt before the fruit is packed, as the berries will then hang on to the bunch better, and the bunch carry in better order. Select the fruit carefully, grade it, and pack firmly so that it will not bruise in transit. If to be sent long distances, pack in crates holding from four to six 6-lb. baskets. Pines will be ripening in quantity towards the end of the month. Gather before fully coloured, and, whether for Southern or local markets, pack and handle carefully to prevent bruising. Do not ship the fruit too green for the Southern markets, as doing so is apt to spoil the trade. Send good fruit to the canneries. Small pines and crippled fruit are no good to canners, and the sooner our growers realise that it only pays to grow good fruit the better for them and for the canners, as if the latter cannot get good fruit it is impossible for them to put a line of goods that will not only be a credit to the State, but for which a world-wide market can be obtained.

Passion fruit should not be allowed to lie about for days on the ground before gathering, as if so they are apt to become fly-infested.

Watermelons and rockmelons are still in season.

Watch any late peaches, Japanese plums, or other fruits liable to be infested with fruit fly, and gather and destroy all infested fruit, or, better still grub the trees out and burn them as they only breed flies to destroy more valuable fruit. Mangoes will be ripening during the month. See that all fly-infested fruits are destroyed, as they will only breed up further crops to destroy later ripening fruits.

Citrus orchards can be cyanided during the month for scale insects, and spraying for Maori, with the sulphide of soda wash should be continued where necessary.

Mangoes can be budded during the month, as well as citrus and deciduous trees. Tropical fruit trees can be transplanted, taking care to choose dull weather and to cover same from the direct rays of the sun till they have become firmly established. Pines and bananas can still be planted.

## THE TROPICAL COAST DISTRICTS.

See that all bananas are covered with netting, as the fly is usually at its worst at this time of year.

Mangoes will be going off. See that they are not allowed to remain about on the ground to breed flies for the Autumn crop of oranges. Longan, litchi, and other fruit are in season. As the month is often a very wet one, little cultivation can be done in the orchards. Strong undergrowth should, however, be kept down with a hoe or scythe. Tropical fruits of all sorts can be planted. Look out for Maori on citrus fruits, and spray when necessary.

## THE SOUTHERN AND CENTRAL TABLELANDS.

January is a busy month in the Stanthorpe district; apples, pears, plums, peaches, and nectarines being in season. Do not gather the fruit too immature; at the same time, don't allow it to be over-ripe. Gather dry, handle carefully, and grade and pack in attractive cases. Keep the fruit as cool as possible, and ship in well-ventilated cars. Keep a sharp lookout for fruit fly, and take every possible means to prevent its spreading, even going as far as to gather and destroy the whole of the fruit on any infected trees, as if kept in check during the month the bulk of the fruit ripening during February will be free.

Keep a sharp lookout also for codling moth, examine the bandages on the trees at least every ten days, and destroy all larvæ found therein; also gather and destroy all moth-infected fruit.

Gather Bartlett pears as soon as they are large enough, and store away in a cool shed to ripen; when they show signs of ripening, market,—not before. If sent down green, they will sell for cooking and only fetch a small price. The right stage at which to gather is when the fruit is fully developed, and the flesh has lost its woody flavour, but is still quite hard. This is usually before the fly has stung it, and if gathered at this stage the fruit will ripen up properly without shrivelling, and develop its full flavour.

These remarks apply also to the Downs country, which is somewhat earlier than Stanthorpe.

The crop of the month in the Western tablelands is the grape; and the remarks I have made respecting this fruit when grown in the Southern Coast districts apply equally here. The fruit should be gathered dry, and wilted before it is packed. Too large cases are often used; cases holding from 20 to 30 lb., or crates holding six 6-lb. baskets, are preferable, the latter being the best package for shipping the fruit long distances. Keep the orchards well cultivated, and, where water for irrigation is available, give citrus trees a watering during the month, unless there has been a sufficient rainfall. When the orchard is irrigated, see that thorough cultivation follows the irrigation, so as to conserve the moisture in the soil.

Red Scale, which is prevalent on citrus trees in the dry Western country, should be treated during the month. Cyaniding is the best remedy.

| Date of issue. | Date of issue. | Date of issue. |
|---|---|---|
| 23. 2. 40. | | |
| 24. 6. 48 | | |
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